2004-07-08 FONSI
UNIVERSITY OF HAWAII ADVANCED
TECHNOLOGY CENTER & RESEARCH CENTER

Final Environmental Assessment

PROPOSED ADVANCED TECHNOLOGY CENTER AND ADVANCED TECHNOLOGY RESEARCH CENTER

Prepared for:

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June 2004

University of Hawaii Institute for Astronomy

MUNEKIYO & HIRAGA, INC.

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Preface

The University of Hawaii, Institute for Astronomy, proposes to develop an Advanced Technology Center and an Advanced Technology Research Center and associated improvements on property identified by TMK 2-3-8:38 and 39 (por.) at Kula, Maui, Hawaii.

Since the proposed project involves the use of State funds, an Environmental Assessment (EA) has been prepared as required by Chapter 343, Hawaii Revised Statutes, to document the proposed action's technical characteristics, environmental impacts and alternatives, as well as advance findings and conclusions relative to the significance of the project.

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Chapter I

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Project Overview

I. PROJECT OVERVIEW

A. PROJECT LOCATION, EXISTING USE, AND LAND OWNERSHIP

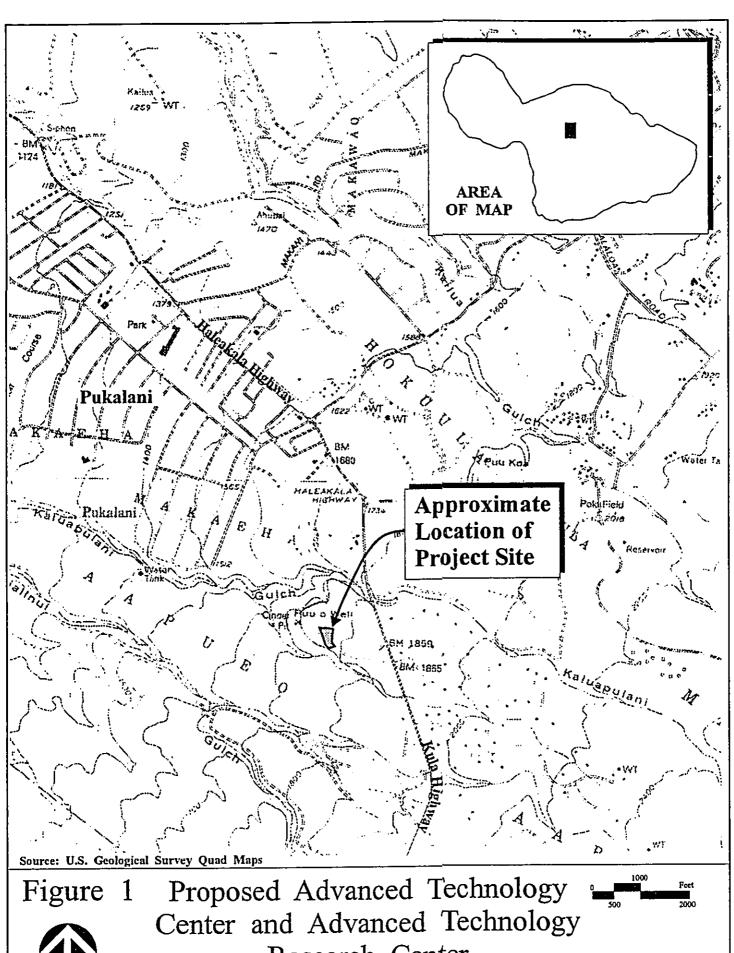
The University of Hawaii, Institute for Astronomy (IFA) proposes the development of an Advanced Technology Center (ATC) and an Advanced Technology Research Center (ATRC) on a 3.4-acre site at Kula, Maui, Hawaii. See Figure 1.

The project site is located in the Kulamalu Town Center Subdivision (aka, Kulamalu Commercial Subdivision), which consists of 53.67 acres and is located in the Kulamalu project area. Currently under development, the Kulamalu project area encompasses a mixture of park, school, business, cultural, multi-family residential, single-family residential and public/quasi-public land uses. The project site is presently vacant and was recently mass-graded during site preparation for the Kulamalu Town Center Subdivision.

Identified by TMK 2-3-08:38 and 39 (por.), the project site is also identified by Lot Nos. 15, 16 and 17 of the Kulamalu Town Center Subdivision. See Figure 2. The site is situated within the limits of the State "Urban" district and is designated for "Business/Commercial" uses by the Makawao-Pukalani-Kula Community Plan and "Country Town Business" uses by Maui County zoning.

The project site is bordered by A'Apueo Parkway to the north, Ohi'a Ku Street (under construction) to the east, and undeveloped subdivision lots to the south and west. Access to the site is to be provided by Kula Highway via A'Apueo Parkway and Ohi'a Ku Street.

Land uses in the vicinity of the project site are characterized by undeveloped agricultural parcels, the Maui campus of Kamehameha

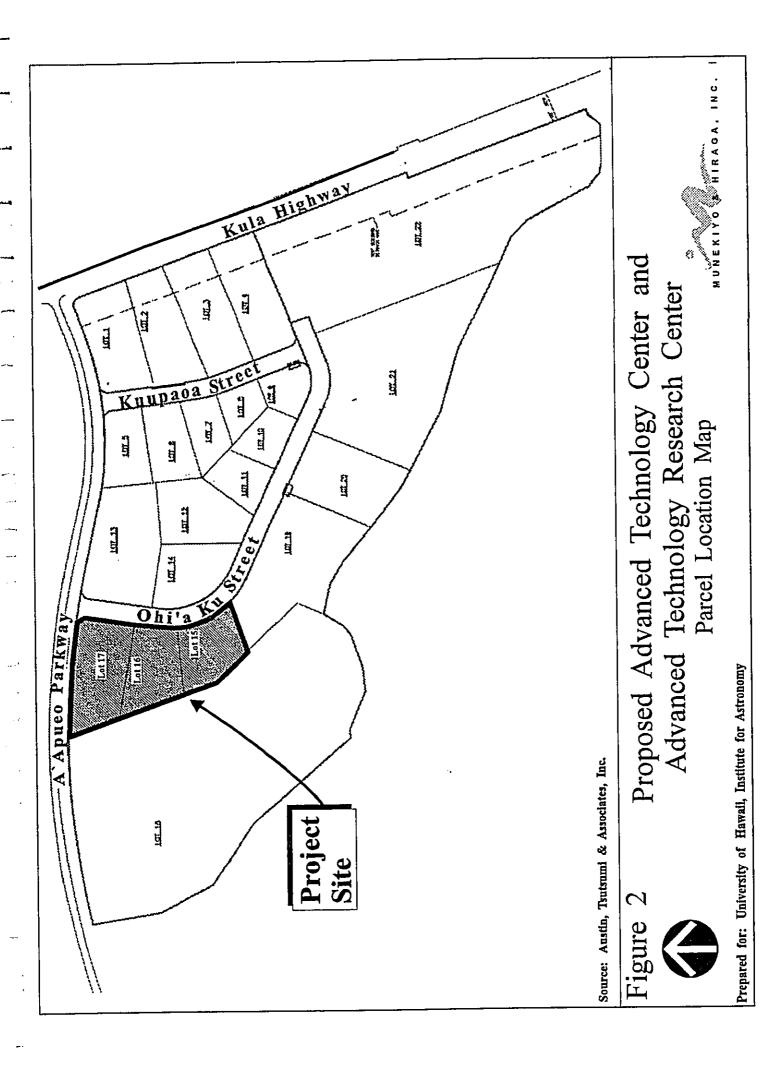


Research Center Regional Location Map MUNEKIYO & HIRAGA, INC.

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Prepared for: University of Hawaii, Institute for Astronomy



Schools, and Kula 200, an agricultural zoned residential subdivision. Kulamalu Science LLC is the fee simple owner of the subject property.

B. BACKGROUND

The Institute for Astronomy (IFA) at the University of Hawaii was founded in 1967 to manage the observatories on Haleakala and Mauna Kea. IFA conducts research into galaxies, cosmology, stars, planets, and the Sun. Its faculty and staff are also involved in astronomy education and in the development of the observatories. IFA has a staff of over 180 persons, including about 45 faculty members. The Institute has an annual budget of \$20 million, including \$15 million in grants from the federal government.

The IFA operates facilities on the islands of Oahu, Hawaii and Maui. Its main base is in Manoa Valley, Oahu, just north of the main campus. The Institute has close links within the UH-Manoa Department of Physics and Astronomy through the astronomy graduate program, which has about 25 students working for their MS and PhD degrees. IFA faculty also teaches many introductory astronomy courses on the Manoa Campus, reaching some 1,000 undergraduate students annually. In addition, IFA operates the TOPS Program, which is an annual summer astronomy education program for Hawaii and Pacific area high school teachers.

C. PROPOSED ACTION

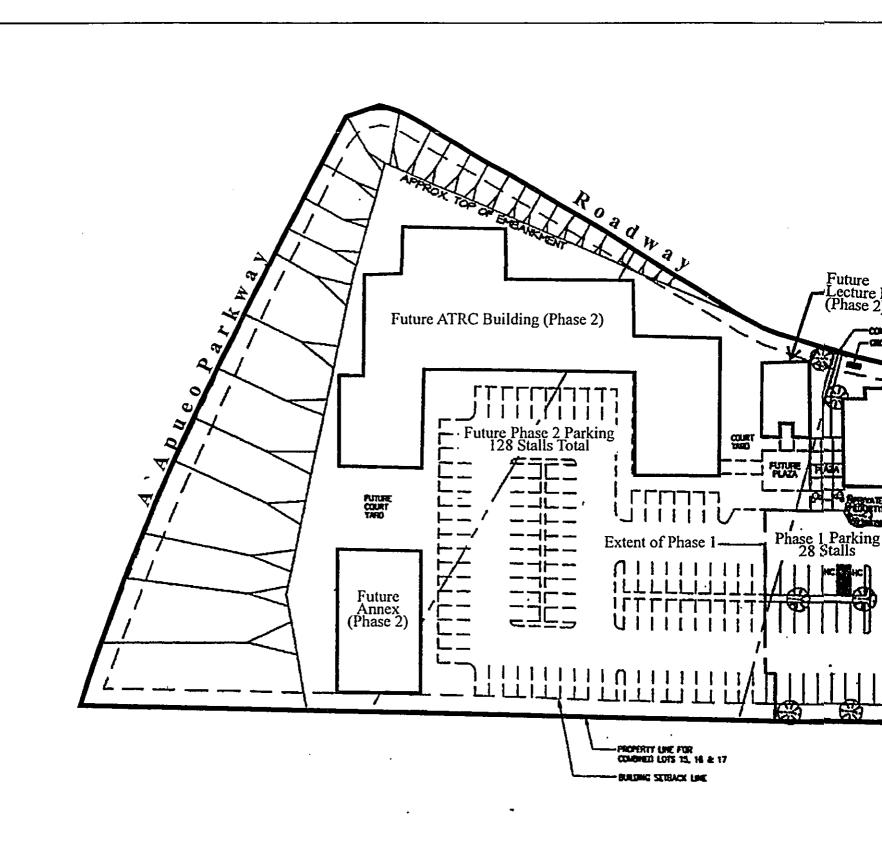
In connection with the development of the project, Lot Nos. 15, 16 and 17 will be consolidated to form a single parcel containing 3.4 acres.

The Advanced Technology Center (ATC) will replace the IFA's existing Waiakoa Laboratory which lacks the space, facilities, and state-of-the-art instrumentation to adequately support the IFA's rapidly growing high-tech research programs.

The ATC, which will be developed on Lot No. 15 and a portion of Lot No. 16, comprises the first phase of the project. See Figure 3 and Appendix "A", Preliminary Development Plans. The approximately 2.0-acre ATC site will contain a 2-story building with about 15,900 square feet of floor area and a 28-stall parking lot, including a loading/service area. The ATC will include spaces for offices, work rooms, storage rooms, equipment rooms, a visitation room, a reception station, a clean room, a machine shop, an electrical room, an observation deck, a component fabrication room, an electronic assembly room, and computer/communication rooms, as well as a lobby, a break room, and restrooms.

The second phase of the project will encompass Lot No. 17 and the remaining portion of Lot No. 16, the development of the Advanced Technology Research Center (ATRC), as well as a two-story annex, a one-story lecture facility (auditorium) and an open air plaza. Refer to Figure 3 and Appendix "A". The ATRC will be a 2-story structure with approximately 34,600 square feet of floor area, while the annex and auditorium will contain approximately 8,300 square feet and 1,200 square feet of floor area, respectively. In addition to providing a 100-stall parking lot and additional space for Phase I ATC uses, the Phase 2 improvements will contain research facilities which will support the IFA's general research programs.

In addition to the Phase 1 and Phase 2 improvements, the proposed action includes the provision of landscaping and parking areas, as well as the installation of utilities. To complement and enhance the Country Town ambiance and character of the Upcountry area, the proposed improvements will be designed in accordance with the Design Standards from the Kulamalu Village Declaration of Covenants, Conditions and Restrictions (DCC&Rs), as well as applicable regulatory standards



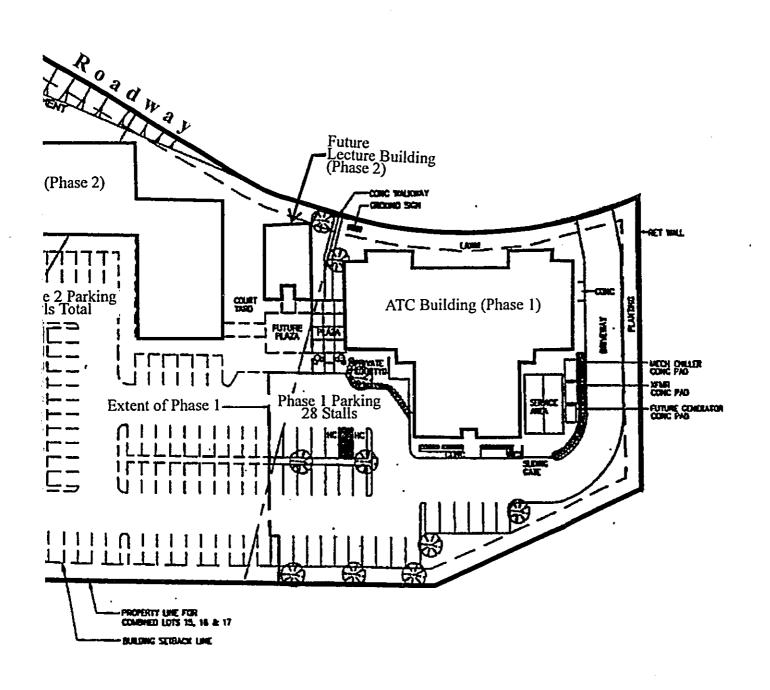
Source: Kober/Hanssen/Mitchell Architects

Figure 3



Proposed Advanced Technology Center and Advanced Technology Research Center Preliminary Site Plan

Prepared for: University of Hawaii, Institute for Astronomy



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pertaining to off-street parking and handicapped accessibility.

In addition, techniques from the "Guidelines for Sustainable Building Design in Hawaii", including, but not limited to the following, will be utilized for the project.

- Erosion and dust controls are to be incorporated as part of construction contract requirements.
- Centralized areas will be designated for recycling and waste diversion.
- Outdoor landscaped areas are being incorporated into the site design.
- Low c glazing or tinted glazing is being specified with window coverings.
- Insulation will be specified as part of the building envelope assembly.
- Task lighting is to be specified at workrooms with lighting controls.
- An energy management system will be specified for monitoring system controls.
- Variable air volume dampers are to be incorporated as part of the mechanical design.
- Variable speed drives (aka, variable fan drives) will be incorporated into the mechanical design.
- The mechanical design will incorporate the use of air-cooled cooling units with appropriately designed motors.

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- Fresh air intakes are to be located to prevent inter-mixing with building exhausts.
- Separate HVAC systems will be utilized for office and work areas.
- The energy management system will be utilized during off hours.
- Solar water heating will be incorporated into the design of the facility.
- Low-flow water fixtures will be incorporated where applicable.

The estimated cost of the ATC is approximately \$8.6 million. Construction of the ATC is expected to commence in the latter part of 2004, with completion anticipated toward the end of 2005. Based on funding, construction of the Phase 2 improvements is anticipated to be completed in late 2006. While the cost and architectural scheme for the Phase 2 improvements will be developed in connection with its detailed design and

engineering phase, the scope of this Environmental Assessment is intended to cover both the Phase 1 and Phase 2 improvements.

Chapter II

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Description of the Physical Environment

II. DESCRIPTION OF THE PHYSICAL ENVIRONMENT

A. PHYSICAL SETTING

1. <u>Climate</u>

The project site is located about 1.25 miles south of Pukalani. The Pukalani area is generally cool and equable year round. Average annual rainfall ranges between 40 and 50 inches per year, with most rainfall occurring between the months of October and April. Average temperature ranges from the low 70's in the coolest month to the high 70's in the warmest month.

Like most areas of the islands, the prevailing wind throughout the year is the northeasterly tradewind, which is generally more persistent during the summer than the winter.

2. <u>Topography and Soil Characteristics</u>

The project site ranges in elevation from 1,774 feet to 1,752 feet above mean sea level. The project site slopes in a northwesterly direction at an approximate grade of three (3) percent.

Underlying the site and surrounding lands are soils belonging to the Waiakoa-Keahua-Molokai association. See Figure 4. This soil association consists of moderately steep, well-drained soils that have a moderately fine textured subsoil located on low uplands. The soils specific to the subject site are Keahua cobbly silty clay loam, 15 to 25 percent slopes (KnaD) and Keahua cobbly silty clay, 7 to 15 percent slopes (KnhC). See Figure 5. A description of these soils is as follows:

Keahua cobbly silty clay loam, 15 to 25 percent slopes (KnaD). On this soil, runoff is medium and the erosion hazard is moderate.

LEGEND

① Pulchu-Ewa-Jaucas association

② Waiakoa-Keahua-Molokai association

(3) Honolua-Olelo association

Rock land-Rough mountainous land association

(6) Puu Pa-Kula-Pane association

Hydrandepts-Tropaquods association

(7) Huna-Makaalae-Kailua association

8 Pauwela-Haiku association

Laumaia-Kaipoipoi-Olinda association

Keawakapu-Makena association

Kamaole-Oanapuka association

Project Vicinity

Pacific Ocean

Source: USDA Soil Conservation Service

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Figure 4 Proposed Advanced Technology Center and Advanced Technology Research Center Soil Association Map

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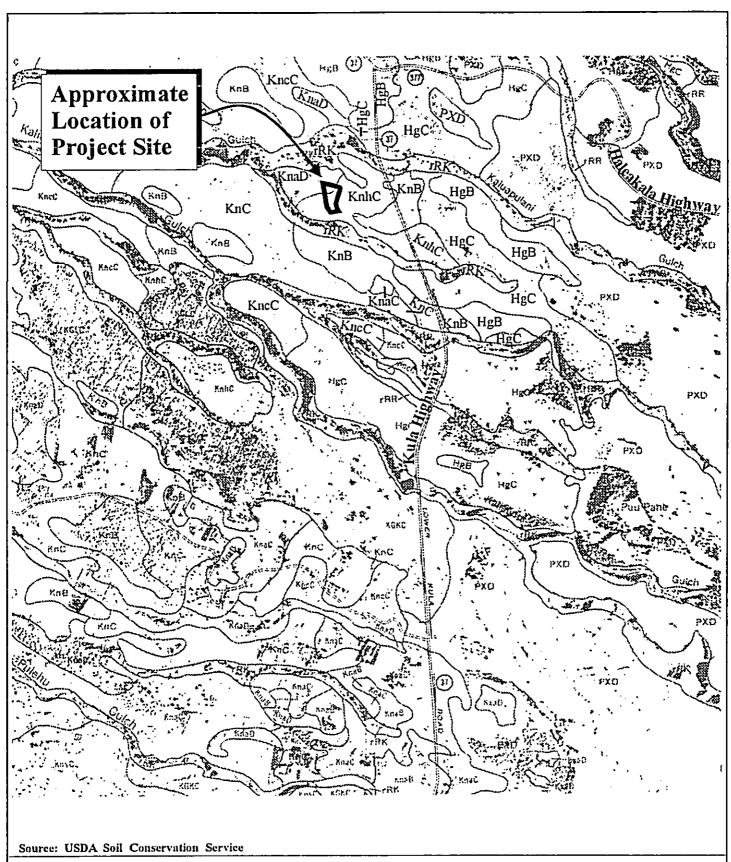


Figure 5 Proposed Advanced Technology Center and Advanced Technology Research Center Soil Classifications Map

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included in mapping were small areas that are not cobbly, as well as a few steep areas.

<u>Keahua cobbly silty clay, 7 to 15 percent slopes (KnhC)</u>. Runoff on this soil is slow to medium and the erosion hazard is slight to moderate. Included in mapping were small areas that are 20 to 40 inches deep over soft, weathered basic indigenous rock.

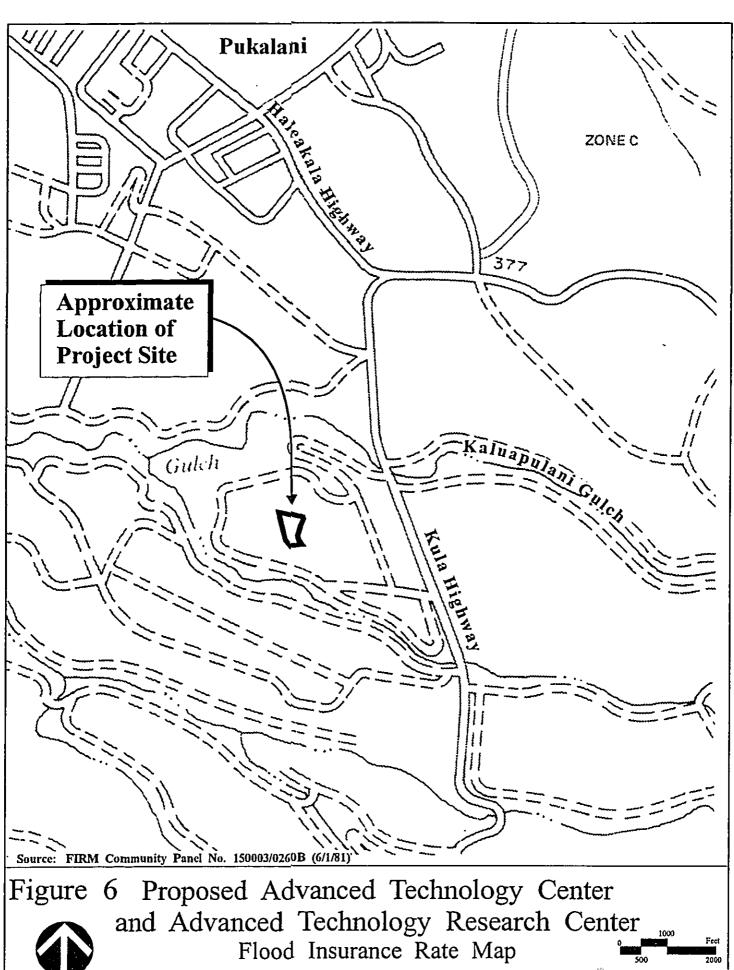
3. Flood Hazard

According to the Federal Emergency Management Agency's Flood Insurance Rate Maps for this area of the island, the project site is situated in an area designated Zone C. See Figure 6. Areas within Zone C are subject to minimal flooding.

4. Flora and Fauna

The project site has been mass-graded and is currently covered with grass and hydromulch from recent site work for the Kulamalu Town Center Subdivision. Prior to grading, the project site was utilized as pasture land and covered by various grasses, as well as low-lying shrubs including guinea grass (Panicum maximum), lantana (Lantana camara L.), sensitive plant (Mimosa pudica), prickly pear (Opuntia ficus-indica), agave (Agave sisalana), and koa-haole (Leucaena leucocephala). Silver oak, eucalyptus and Christmas berry trees were also located at the project site.

Fauna species common to the region include mongoose, chickens, rats, dogs, and cats. Avifauna typically found in the region include mynas, doves, sparrows, and cardinals.



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5. Archaeological Resources

Archaeological surveys of the Kulamalu project area (including the project site) were conducted by Paul H. Rosendahl, Inc. for the Environmental Assessment for the Kulamalu Town Center Subdivision. The archaeological surveys found no archaeological resources at the 3.4-acre project site.

6. Air Quality and Noise

There are no point sources of airborne emissions in the immediate vicinity of the project site. The air quality of the surrounding area is considered good, with existing airborne pollutants attributed primarily to automobile exhaust from the region's roadways.

Surrounding noise levels in the region are characteristic of the rural environment and are considered to be low. Noise levels are primarily affected by traffic and natural (e.g. wind) conditions.

7. Scenic and Open Space Resources

The project site is not located within a scenic view corridor. Haleakala, Maui's central isthmus, the West Maui Mountains, and the islands of Lanai and Kahoolawe comprise scenic resources that are visible from the project site. Open space resources in the region are characterized by the vast expanse of lands encompassed by Haleakala National Park and agricultural lands that lie between areas of existing rural and suburban development.

B. COMMUNITY SETTING

1. Community Character

The Makawao-Pukalani-Kula region, also known as Upcountry, is a sprawling agricultural, rural and suburban area on the western

slope of Haleakala. Pineapple cultivation, smaller independent farming and cattle ranching are the predominant agricultural activities within the region. The towns of Makawao and Pukalani are the region's main settlement areas and are characterized by a mixture of suburban and rural land uses. Kula's residential settlements reflect a lower density over a larger area with smaller commercial clusters in Pulehu, Waiakoa, and Keokea. The region is also home to many individuals who commute to work in other areas of the island.

2. Land Use History

The lands underlying the project area were originally part of a 160-acre parcel deeded to Aui as Grant 1167. A small triangular wedge on the northwest side of the project area was a portion of Grant 1829, Apana 1 to Keawe. The property was formerly in use as cattle pasture.

There are no known outstanding citations regarding violations of statutes, ordinances, or rules pertaining to the subject property.

3. <u>Surrounding Land Uses</u>

Existing land uses in the vicinity of the project site include low-density residential homes to the south of the gulch that forms the southern border of the Kulamalu Town Center Subdivision. Residential homes are also located to the east of the project site across Kula Highway. The King Kekaulike High School is located approximately 0.5 mile north of the project site while the Maui Campus of Kamehameha Schools is located approximately 0.25 mile west of the project site.

C. SOCIO-ECONOMIC ENVIRONMENT

1. Population

The population of the County of Maui has exhibited relatively strong growth over the past decade with the 2000 population at 128,241, a 27.6 percent increase over the 1990 population of 100,504 (SMS, June 2002). Growth in the County is expected to continue, with the resident population for the year 2010 projected to be 151,269 (SMS, June 2002).

Just as the County's population is estimated to grow, the resident population of the Makawao-Pukalani-Kula Community Plan region has also increased. In 2002, the population of the Makawao-Pukalani-Kula region was 21,571 (SMS, June 2002). The resident population in the region is projected to increase to 25,237 in the year 2010 (SMS, June 2002).

2. Economy

Agriculture and tourism are vital components of Maui's economy. The cultivation of pineapple and sugar cane and the tourist industry provides for much of the island's economic stability.

The Makawao-Pukalani-Kula region provides the backdrop for ranching of cattle and other farm animals by various individuals. There are a number of farms in the Kula region growing products such as cabbages, onions, tomatoes, corn, carnation and protea. Pineapple is also cultivated on fields surrounding the area. Sugar cane cultivation takes place on lower elevation lands extending to the central isthmus.

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D. PUBLIC SERVICES

1. Police and Fire Protection

The County of Maui's Police Department is headquartered at its Wailuku Station. The Department consists of several patrol, investigative, and administrative divisions. The department's Upcountry patrol covers the Makawao-Pukalani-Kula region. The nearest police substation is located at the Eddie Tam Gymnasium in Makawao, approximately 2.5 miles away. A new police community service center will be located in the Kulamalu Town Center park.

Presently, fire prevention, suppression and protection for the region is offered by the County's Department of Fire Control Makawao and Kula Stations. The Makawao Station is located on Makawao Avenue, approximately 1.0 mile away from the project site. The Kula Station is located adjacent to Kula Elementary School, approximately 4.2 miles away from the project site.

2. <u>Medical Facilities</u>

Maui Memorial Medical Center, the only major medical facility on the island, services the Makawao region. Acute, general and emergency care services are provided by the approximately 200-bed facility that is located in Wailuku. Medical/dental offices are located in Pukalani and Makawao to serve the Upcountry region's residents.

3. Schools

The State of Hawaii, Department of Education, operates five (5) public schools in Upcountry Maui. They are Makawao Elementary School, Kalama Intermediate School, Pukalani Elementary School,

Kula Elementary School, and King Kekaulike High School.

The region is also served by the privately operated Waldorf School, Haleakala School, Seabury Hall, and the Maui Campus of Kamehameha Schools.

4. Recreational Facilities

Upcountry Maui is served by numerous recreational facilities offering diverse opportunities for the region's residents. These facilities include the County's Eddie Tam Park/Gym, Pukalani Recreation Center, Keokea Park, Rice Park, Kula Gym, and the Kula Ball Park.

5. Solid Waste

Solid waste generated in the Upcountry region are transported to the Central Maui Landfill in Puunene. Outside of Hana, the Central Maui Landfill is the only disposal site on the island of Maui.

E. INFRASTRUCTURE

1. Roadways

The existing roadway system in the vicinity of the project includes the following roadways and intersections.

a. Roadways

Haleakala Highway is a two-lane State Highway that is generally oriented in a northwest-southeast direction. This roadway begins in Kahului in the vicinity of the Triangle Square Commercial project. The highway intersects Old Haleakala Highway and Kula Highway at the Five Trees Junction and terminates at Haleakala National Park.

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Haleakala Highway is a three-lane facility from Hana Highway to Makawao Avenue with two (2) lanes in the eastbound (mauka) direction and a single lane in the westbound (makai) direction. Haleakala Highway has a posted speed limit of 45 miles per hour (mph) on the section between Makawao Avenue and Kula Highway. East of the Five Trees Junction, Haleakala Highway has a posted speed limit sign of 30 mph. The State is in the process of widening Haleakala Highway from two (2) to four (4) lanes between Hana Highway and its intersection with the Old Haleakala Highway (western junction). A grassed median will be provided to separate the mauka and makai-bound travel lanes and the existing traffic signal system at the highway and fire break road junction will be relocated. In addition, a new traffic signal system will be installed at the highway's intersection with Haliimaile Road. The completion of this widening project is anticipated to occur in the 2005 timeframe.

Kula Highway is a two-lane, rural, arterial, State highway that connects the Pukalani area with the Ulupalakua area. Kula Highway is generally oriented in the north-south direction and begins in Pukalani at the Five Trees Junction of Old Haleakala Highway and Haleakala Highway. In the vicinity of the project site, Kula Highway has a posted speed limit of 45 mph.

Old Haleakala Highway is a two-lane, County collector road that serves the Pukalani area. Old Haleakala Highway is generally oriented in a northwest-southeast direction and provides a parallel route to Haleakala Highway through the town of Pukalani. Old Haleakala Highway begins at its intersection with Haleakala Highway approximately 0.5 mile east of Haliimaile Road and terminates at the Five Trees Junction at Haleakala Highway and Kula Highway. Old Haleakala Highway has a posted speed limit of 35 mph.

Makani Road is a two-lane, County collector road that serves Pukalani town and Makawao town. Makani Road is generally oriented in the north-south direction, originating within Pukalani at its intersection with Old Haleakala Highway, and extending northeasterly to eventually intersect with Makawao Avenue.

<u>Pukalani Street</u> is a two-lane, County collector roadway serving residential and commercial areas in Pukalani town. Pukalani Street is generally oriented in the north-south direction, originating at its intersection with Old Haleakala Highway, and extending southwesterly to the Pukalani County Club Golf Course.

Within the study area, <u>Makawao Avenue</u> is a two-lane, County collector road that serves Pukalani town and Makawao town. Makawao Avenue is generally oriented in the north-south direction, originating at Pukalani from its intersection with Old Haleakala Highway and terminating across from Kaupakulua Road north of its intersection with Baldwin Avenue.

Loha Street is a two-lane, County collector roadway serving

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residential areas in Pukalani. Loha Street is a continuation of Makawao Avenue south of its intersection with Old Haleakala Highway.

A'Apueo Parkway is a two-lane, east-west, private collector roadway with a posted speed limit of 20 mph. (At the time of writing this report, it is signed as part of an active construction site not open to the public.) A'Apueo Parkway serves as the only access to the Maui Campus of Kamehameha Schools and the Kulamalu project area.

b. <u>Intersections</u>

Haleakala Highway/Old Haleakala Highway (western junction) A contraflow operation on Haleakala Highway is implemented during the weekday AM peak period of traffic. When the contraflow operation is in effect, all traffic on the Haleakala Highway eastbound approach is forced to exit via right turn onto Old Haleakala Highway and right-turns from the Old Haleakala Highway approach onto Haleakala Highway are prohibited. As a result of the AM contraflow operation, there is no conflicting traffic for the northbound to westbound left-turn movement from the Old Haleakala Highway approach.

<u>Haleakala Highway/Makani Road</u> is a "cross" intersection with traffic on Makani Road controlled by a stop sign.

<u>Haleakala Highway/Makawao Avenue</u> is a signalized "cross" intersection.

Haleakala Highway/Kula Highway/Old Haleakala Highway

(Five Trees Junction) is a signalized "cross" intersection. Haleakala Highway is the southbound and westbound approaches of the intersection (Haleakala Highway makes a 90 degree turn at this intersection). Kula Highway is the northbound approach and Old Haleakala Highway is the eastbound approach at this intersection.

Old Haleakala Highway/Pukalani Street is a signalized "tee" intersection with Pukalani Street as the stem.

Old Haleakala Highway/Makawao Avenue/Loha Street is a signalized "cross" intersection.

Kula Highway/King Kekaulike High School (KKHS)

<u>Driveway/Residential Driveway</u> is an unsignalized "cross" intersection.

Kula Highway/A'apueo Parkway is an unsignalized "tee"-intersection with A'apueo Parkway as the stop sign-controlled stem.

Access to the project site is currently provided from Kula Highway by A'Apueo Parkway. Ku'upaoa Street and Ohi'a Ku Street, which are presently under construction, are roadways which branch off from A'Apueo Parkway on the south and provide internal circulation and access for lots within the Kulamalu Town Center Subdivision. The project site is located along Ohi'a Ku Street. Situated within a 60-foot right-of-way, Ohi'a Ku Street is designed with a curb-to-

curb pavement width of 40 feet.

2. Water

The Makawao-Haiku system is supplied by surface water runoff collected on the windward slopes of Haleakala. This water is collected and conveyed by the Wailoa irrigation ditch and tunnel system, owned and maintained by the East Maui Irrigation Company (EMI), with a capacity of 190 million gallons per day (mgd). The County of Maui, Department of Water Supply (DWS) has an agreement with EMI to draw up to 12 mgd at Kamole Weir forebay.

This water is then treated by the Kamole Weir Water Treatment Plant (WTP), owned and operated by DWS. Kamole Weir WTP is located northeast of Haliimaile near the intersection of Baldwin Avenue and Haliimaile Road. It has a 300,000 gallon concrete treated water storage tank at a floor elevation of 1,114 feet above mean sea level (msl), and can treat up to 8 mgd in compliance with EPA Safe Drinking Water standards.

Water from the Kamole Weir WTP is transmitted by pumping to Makawao through a 24-inch diameter force main along Baldwin Avenue and Olinda Road. Storage is provided by the 0.3 and 2.0 million gallon Pookela tanks at floor elevations of 1,808 and 1,830 feet msl, respectively.

Water is then pumped via an 18-inch force main to the 0.5 mg Maluhia Tank at 2,051 feet msl.

There is a 12-inch main running along Olinda Road, Hanamu Road

and Haleakala Highway from the Maluhia Tank to the King Kekaulike High School.

Via an agreement with the Board of Water Supply, a well and related improvements were constructed at Huluhulunui Gulch near Kaupakalua to provide domestic water and fire protection for the Kulamalu project area. A new 1.0 million gallon (MG) off-site reservoir was constructed above King Kekaulike High School to provide water storage for the Kulamalu project area, including the project site. To convey water from the 1.0 MG reservoir to the Kulamalu project, approximately 2,300 lineal feet of new 12-inch waterline was installed along Kula Highway.

A Preliminary Engineering Report has been prepared for the proposed project. See Appendix "B". As noted in the report, existing 12-inch ductile iron County waterlines are located within A'Apueo Parkway and Ohi'a Ku Street. There are existing fire hydrants surrounding the project site. Water service (3/4-inch laterals) is available for each of the lots in the Kulamalu Town Center Subdivision.

3. Wastewater

There are no County wastewater treatment facilities serving the Kula-Pukalani area. Other than a private wastewater treatment plant which serves Pukalani Terrace residents, wastewater disposal is accommodated via cesspools or individual wastewater treatment systems such as septic tanks. The plant currently provides treated wastewater to the Pukalani Terrace Country Club golf course for irrigation purposes.

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An existing sewer system is located within Ohi'a Ku Street and A'Aupueo Parkway. Refer to Appendix "B". Sewer service laterals are available for each of the lots in the Kulamalu Town Center Subdivision. Wastewater generated by the project will be accommodated by the privately owned Pukalani wastewater treatment plant via a capacity allocation that was granted to the developer of the Kulamalu project area.

4. <u>Drainage</u>

As indicated in the Preliminary Engineering Report for the proposed project, onsite stormwater runoff within the project site generally sheet flows in a northwesterly direction towards Lot 17 and eventually flows towards an existing underground drainage system within A'Apueo Parkway. Refer to Appendix "B". In addition, there is an existing underground drainage system that lies within Ohi'a Ku Street.

Based on a 50 year - 1 hour storm recurrence interval, existing onsite runoff is estimated at approximately 1.32 cubic feet per second (cfs) and 3.16 cfs for Phases 1 and 2, respectively.

5. Electrical, Telephone, and CATV

The distribution system for electrical, telephone, and cable television (CATV) services in the region are situated in the Kula Highway right-of-way and are provided by Maui Electric, Verizon Hawaii, and Hawaiian Cablevision, respectively.

Chapter III

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Potential Impacts and Mitigation Measures

III. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. PHYSICAL SETTING

1. Geographic Features

No significant impacts to topography and soils are anticipated. Given that the project site has already been mass graded, future grading activities will be limited to the proposed building sites, access and internal roads, and parking areas.

Two (2) intermittent natural drainageways are located in the vicinity of the project site. Kaluapulani Gulch lies beyond the project site to the north, while an unnamed gulch is situated beyond the site to the south. The proposed project is not expected to have an adverse effect on the existing physical environment.

In addition, the subject property is not located within a flood plain, tsunami zone, or erosion-prone area, nor is it situated on geologically hazardous lands or located by an estuary, fresh waters, or coastal waters. The Flood Insurance Rate Maps for the island reflect that the project site falls within Zone C, an area of minimal flooding. The site also lies beyond the limits of tsunami inundation as indicated by Civil Defense maps for Maui. In addition, the soils underlying the subject property are well-drained and characterized by slow to moderate runoff.

There are no wetlands, streams, or other water bodies on the subject property. The proposed project will not involve the discharge of any fill material into Kaluapulani Gulch or any of its tributaries.

2. Flora and Fauna

There are no rare, threatened, or endangered species of flora or fauna on the project site. The project site was formerly utilized as pasture land and was previously occupied by various grasses and lowlying scrub vegetation. Inasmuch as the project site has been recently mass graded and is currently vacant and undeveloped, the use of the site for the proposed improvements is not expected to have an adverse effect on flora and fauna in the vicinity.

3. <u>Archaeological Resources</u>

As previously indicated, the project site was formerly utilized as pasture and has been recently disturbed in connection with the mass grading for the Kulamalu Town Center Subdivision. In addition, the archaeological surveys that were conducted of the Kulamalu project area did not locate any archaeological sites or cultural artifacts on the project site. In the event significant cultural deposits or human burials are encountered during construction of the project, work will cease in the area of the find and the find will be protected from further disturbance. The State Historic Preservation Division will then be promptly notified to determine appropriate mitigation measures.

4. Cultural Impact Assessment

A Cultural Impact Assessment has been prepared for the proposed project. See Appendix "D".

a. Historical Context

As noted in the assessment, the project site is situated within the ahupua'a of Kula and is located in the 'ili of 'A'apueo. Situated on a high, elevated plain within the

ahupua'a, the 'ili is nestled along ridges and bordered by gulches that would have protected this area and made it a safe place to live. The assessment notes that there are various translations for 'A'apueo. One translation is "the owl's will", while another reflects the a'a rock topography of the area. Most sources, however, believe that 'A'apueo was named after a female deity who once resided in the area.

As noted in the Cultural Impact Assessment, the vegetation in the Kula and 'A'apueo areas do not flourish as generously as in other ahupua'a on Maui. Due to its remote geographic location, the Hawaiian archipelago evolved with myriad species of flora and fauna, some of which are unique and found nowhere else in the world. Plant life in the Kula area include the 'lliahi (santalum freyecinetianum) or sandalwood, which was traditionally used to scent kapa cloth and occasionally used to make 'ukeke (a musical bow), the only traditional Hawaiian stringed instrument. The leaves and wood of the 'lliahi were also used medicinally, often in combination with 'awa and other woods. One type of 'Iliahi (with a red flower and of the lanaiense variety) is an endangered species and is found only on Lana'i and in East Maui where there are about 100 plants on the south slope of Haleakala. Other medicinal plants from this area include the 'Ahina Kuahiwi (gunnera petaloidea), also known as the Ka'ape'ape or 'Ape'ape, and the Mau'u Laili (sisyrinchium acre), a crawling grass (native iris) found in the highest elevations of the Kula area. The Mau'u La'ili is used to treat skin disorders. The durable wood of the golden-flowered lacy Mamane or Kolomona tree (sophora chrysophylla) was

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utilized to make o'o (digging sticks), house poles, and holua sleds. Due to the arid conditions in Kula, kalo or taro was not a suitable plant crop. To supplement the need for wetland kalo, the 'uala (sweet potato) was grown as an alternative. Sweet potato was just as stable and healthy as kalo and required less water to bear fruit, while kalo grew best in fields of fresh running water. The 'ulu (artocarpus incisus) or breadfruit was also cultivated as a dietary supplement for kalo. Another plant found in the Kula area is the 'a'ali'i (dodonaea) bush. This hardwood native shrub is indigenous to the islands and grows well in dryer climates. The 'a'ali'i is found at elevations of up to 8,000 feet and in wind-swept, open country. It can also be found in the gulches and area surrounding the project site. important plant used to construct thatched homes was Pili grass (heterogon contortus), which used to grow in arid and dusty conditions. The native Hawaiians would group dried clumps of Pili grass together to form a waterproof dwelling.

The Cultural Impact Assessment indicates that there is little recorded information about wildlife in the Kula and 'A'apueo areas. It is noted, however, that foreign plants, feral animals, and fowl have invaded these areas and resulted in the destruction of much of the area's natural habitat. As indicated in the assessment, the native owl seldom takes flight in the area. The common barn owl (native to North America), which tends to be more aggressive and has caused a depletion of other native bird and plant species, primarily inhabits the region. The assessment also notes that wild deer, that were introduced within the past 30 years,

have caused erosion and crop damage to farms and surrounding areas in Kula.

As noted in the Cultural Impact Assessment, the word Kula translates to "plain" in the Hawaiian language. While this may not fully describe the topography within this ahupua'a, much of its landscape is arid and farming was limited to plant crops that could tolerate hot days and cold evenings. Although the landscape in Kula has changed considerably over the past few centuries, the climate has remained constant. The assessment also notes that many of the culturally significant sites, such as heiau and ahu, no longer exist due to the "paniolo" (Hawaiian cowboy) age. During this era, much of the land was cleared for cattle ranching activities and heiau and ahu were plundered without regard for its significance to the area. Later, during the late 1950s and 1960s, population growth in the Kula region further affected data recovery and contributed to the lack of information on culturally significant sites.

To obtain a range of cultural perspectives, interviews were held with several individuals with knowledge of and familiarity with the project area. A summary of some of these interviews follows.

(1) Frances Lamadora

Ms. Lamadora stated that she was born in Hali'imaile, and when she was a teenager, her family moved to Pukalani. Her home is across the gulch (Makawao area) of the project site. She related that when she was growing up in the area, they used to walk through the gulches, and through the project area. They used to see all kinds of "Hawaiian things" in the gulch, but always remembered what her parents

taught them. They were not to touch things, or to be "niele (curious) when they saw anything that belonged to the ancient culture of Hawai'i.

She recalls that her "Tutu" (grandparent) used to tell that the real name for the area that they lived in was Maka'eha. Her grandmother used to scold her because they tried to shoot the owls that flew in the area with a slingshot. Her grandmother told her the owl was their Aumakua (family god), so she should not harm the owl.

She remembers that there was a Heiau (Hawaiian temple) above her home, but she was always told by her parents to stay away from the "stone pile". She does not remember anything about the area being studied, except for the high grass that was growing in the area of the project.

(2) Hokulani Holt-Padilla

Ms. Holt-Padilla related that she is aware of the project area, and is familiar with the past cultural history of the area. She did not know of any archaeological sites within the study area. However, she is aware of the gulches and ancient Heiau in other areas surrounding the project site.

(3) Charles Maxwell

Charles Maxwell was born in Lahaina, Maui in 1937. Three years later, Charles and his family moved to Kula where he grew up and was raised. From birth until kindergarten, Charles spoke only Hawaiian since that was the only language his parents spoke at home. Through public schooling, Charles learned the English language.

As the youngest family member, Charles's parents taught him much about Hawaiian cultural practices, including religious ceremonies for reinterring ancient Hawaiian remains. From the age of 19, Charles handled the reinterment of inadvertently discovered ancient remains.

As a teen, Charles would go into Haleakala Crater to hunt and camp. During one of his trips, he discovered a cave containing an akua ka'ai (sacred image). This experience later led to his becoming a member of the State Cave Task Force which advances the knowledge of burial caves and of their sacredness to the Hawaiian people.

Later, as a young man, Charles attended Maui Community College and, in 1968, received a degree in police science. For 15 years, Charles served as an officer with the Maui Police Department on the island of Molokai. In 1974, Charles retired due to injuries sustained in the line of duty.

After being injured, Charles did a lot of research on all phases of the Hawaiian culture, including oral history interviews with kupuna (elders). He also became very active in community affairs associated with native Hawaiian rights and culture. For example, Charles served as the first president of the A.L.O.H.A. (Aboriginal Lands of Hawaiian Ancestry) Association and journeyed to Washington D.C. to seek reparations from the federal government for the overthrow of the Hawaiian monarchy. Charles organized and led the first native Hawaiian occupation of Kahoolawe to protest the use of the island as a bombing range by the U.S. Navy. Charles was also instrumental in establishing guidelines for subsistence practices for the island based on ancient Hawaiian methods of fishing. In 1991, when a tiger shark fatally attacked a woman swimming at Olowalu, Charles spearheaded efforts to successfully halt a shark eradication program on the basis that the shark was the "amakua" (personal god) to some Hawaiian families. Charles currently serves as a Hawaiian cultural representative on the State Shark Task Force.

Insofar as the project area is concerned, Charles mentioned that 'A'apueo Parkway was named after the female owl-goddess who lived in the area. Charles wrote a chant about 'A'apueo which was performed during one of the annual Merrie Monarch Festivals in Hilo.

In pre-contact times, Charles mentioned that lands in the project area served as the site for the observance of the Makahiki, an annual event held during the months of January and February at which time taxes were collected and festivities were held. Charles also mentioned that gulches in the area once contained adze factories and that evidence suggests that streams flowed within these gulches at one time.

During post-contact times, Charles indicated that the land mauka of the project site (across Kula Highway) was known for having the best sweet potato patches on the island. The sweet potatoes were planted to supply prospectors with food during the California gold rush. Later, with the advent of cattle ranching, Charles mentioned that the indigenous plants and trees in the area were wiped out and the forest line moved higher up the slopes of Haleakala. Without the forests to capture rain clouds and facilitate precipitation, stream flows in the gulches ceased.

In terms of cultural resources, Charles indicated that he is not aware of, nor has he observed, any cultural, gathering, or subsistence practices occurring on lands within the project area. In light of the foregoing, it was noted that the proposed project is not expected to have an adverse impact on native Hawaiian cultural resources, practices, and beliefs.

As indicated by the Cultural Impact Assessment, while much of Kula today is still largely zoned for agricultural uses, the area has become suburban in character. As noted by the assessment, much of Kula's natural and indigenous landscape barely exists. The thinking then should be to reverse the impact on the lands, such as planting shrubs native to the area, desecrate the land as little as possible, and stop using tactics such as those of the "paniolo" era. The assessment also notes that more cautious approaches to certain areas are solutions to the vitality of our

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Hawaii. In addition, the assessment indicates that the proposed project will not affect the fauna, flora or endangered species, because they have already been impacted by prior agricultural disturbances which occurred in the project area. Furthermore, because of prior disturbance to the site, no cultural or archaeological properties were found for preservation. In the 3.4acre project area, no evidence of past or present use for Hawaiian cultural practices, resources, or beliefs were found in the study area. The assessment notes that as there are no areas of impact from the proposed construction on this site, mitigation measures are not necessary. The project area does not pose an impact on access rights by Native Hawaiians that would require the use of this area for cultural and spiritual purposes. In light of the foregoing, and based on an evaluation of the preceding informant interviews, the proposed action is not expected to have an adverse impact on native Hawaiian cultural beliefs, practices, resources or gathering rights.

5. Air Quality

Air quality impacts are anticipated to be confined to construction related activities. Proper emission control devices and dust control measures, such as regular watering, are anticipated to minimize potential impacts.

In the long term, project-related vehicular traffic will generate automotive emissions. However, these emissions are not expected to adversely impact local and regional air quality conditions.

6. Noise

Ambient noise conditions will be affected over the short term by

construction activities. Construction tools and equipment, such as power tools, bulldozers, front-end loaders and materials-carrying trucks, are anticipated to be the dominant sources of noise. Proper equipment and vehicle maintenance are anticipated to minimize noise levels. Equipment mufflers or other sound attenuating devices may also be utilized as needed. In addition, all exterior construction work will be limited to normal daylight hours.

No significant adverse long-term impacts are anticipated to result from development of the project.

7. <u>Scenic and Open Space Resources</u>

The proposed project is not expected to have an adverse effect on scenic and open space resources in the area. To complement and enhance the Country Town atmosphere of the Upcountry area, the proposed buildings will be designed in accordance with the Design Standards from the Kulamalu Village CC&Rs dated November 2000. The proposed improvements will integrate low-rise structures, landscaping and parking areas to provide facilities which not only address spatial requirements but are compatible with the surrounding environment.

The project site is not part of a scenic corridor. The proposed improvements will not encroach into view corridors and affect views from inland vantage points. The improvements will be designed and landscaped to complement and enhance the visual character of the surrounding area.

8. <u>Use of Chemicals and Fertilizers</u>

Use of herbicides on the project site will generally be limited to the

initial plant establishment period. Pesticides are anticipated to be used only as a treatment and not as a preventive measure. As a treatment, application usage will be minimal. In addition, plant selection for the project will be based on hardiness, drought tolerance, pest resistance as well as aesthetic concerns.

Nitrogen/Phosphorus/Potash mixed fertilizers are anticipated to be applied to lawn areas, groundcover, and flowering shrubs. With proper irrigation management practices, leaching of fertilizers should be negligible.

The Resource Conservation and Recovery Act (RCRA) and the Hazardous and Solid Waste Amendments of 1984 set standards and requirements for the management of solid and hazardous wastes. RCRA regulations (42 USC 6901 et seq. 40 CFR Parts 260 to 272) define hazardous waste as any discarded material that is solid, liquid or gaseous and that "because of its quantity, concentration or physical, chemical or infectious characteristics may contribute to an increase in mortality or serious illness or the environment when improperly managed."

40 CFR Part 261 defines hazardous wastes and also provides lists of hazardous wastes from specific and nonspecific sources. Materials that are neither solid nor hazardous wastes and small quantities are exempt from all or part of the regulations.

It is unknown at the present time what, if any, hazardous products will be used during routine facility maintenance and operations activities. The IFA will comply with the Resource Conservation and Recovery Act, as amended. Any defined hazardous waste will be

handled by an authorized Transport Storage and Disposal Facility.

No adverse effects on surface, underground and marine water resources are anticipated.

9. Agriculture

As previously indicated, the project site is located on lands in the State Urban District and is also designated for Business/Commercial and Country Town Business uses by the Makawao-Pukalani-Kula Community Plan and Maui County zoning, respectively.

The project site was formerly utilized for cattle grazing. There are approximately 71,800 acres of agricultural land within the community plan region. The use of 3.4 acres of urban designated land for the proposed project is not expected to have an adverse impact on agriculture, nor is it anticipated to affect lands that are available for agricultural use.

B. COMMUNITY SETTING

1. Surrounding Uses

The proposed project is consistent with land uses surrounding the site. The 3.4-acre project site is located in the Kulamalu Town Center Subdivision, a mixed use development which contains 19.41 acres of land (including the project site) designated for business uses.

In addition, the project site and the other subdivision lots designated for business uses are set aside for Business/Commercial and Country Town Business uses by the

Makawao-Pukalani-Kula Community Plan and Maui County zoning, respectively.

The proposed project is in consonance with the land uses permitted for the site, and is also compatible with the business designated uses of the adjacent parcels.

C. <u>SOCIO-ECONOMIC_ENVIRONMENT</u>

1. Population and Economy

On a short-term basis, the project will support construction and construction-related employment.

In the long term, the proposed project will support the economy through its contribution of taxes and salaries, as well as through the purchases of goods and services from local businesses.

D. PUBLIC SERVICES

1. Police, Fire and Medical Services

The project site is located within the service area limits for police, fire, and emergency medical services. The proposed project is not anticipated to affect the service area limits or affect the service capabilities of police, fire, and emergency medical operations.

2. Recreational and Educational Facilities

The proposed project will not have an adverse effect on existing recreational or educational resources, nor will it generate a demand for additional parks or schools.

It should also be noted that within the project area, there are no known traditional beach and mountain access trails.

3. Solid Waste

On a short-term basis, construction activities will require the disposal of construction-related solid waste. The IFA will work with the contractor to minimize the amount of solid waste generated during the construction of the project. As appropriate, a private construction waste disposal facility will be utilized by the contractor for the disposal of construction waste materials. In the long term, solid waste collection for the project will be provided by a commercial waste disposal service.

E. <u>INFRASTRUCTURE</u>

1. Roadways

Access from Kula Highway to the project site area is presently provided via A'Apueo Parkway. From A'Apueo Parkway, primary access to the site will be provided via Ohi'a Ku Street, while secondary access will be provided by Ku'upaoa Street. Both roadways are currently under construction. Appropriate traffic control measures will be utilized during the construction period to minimize impacts to traffic flow and provide for the safe passage of vehicles.

A Traffic Impact Analysis Report has been prepared for the proposed project. See Appendix "C". The TIAR uses accepted methods for analyzing signalized and unsignalized intersections, as set forth by the 2000 Highway Capacity Manual.

Conclusions

The following are the conclusions of the traffic study for Year 2005 with Phase 1 of the project.

a. Year 2005 with Phase 1

- Development of Phase 1 of the project could potentially generate approximately 31 and 24 total trips during the AM and PM peak hours of traffic, respectively.
- The trip generation estimate for Phase 1 is conservative as it assumes worst-case conditions for the peak hours of traffic. IFA staff will likely enter and exit at various times of the day based on viewing conditions at the summit rather than at a fixed time.
- Approximately two-thirds of the estimated Phase 1 traffic should be considered as "diverted or re-routed existing traffic" since Phase 1 is a relocation of the existing IFA Waiakoa Laboratory in Kula. The analysis is conservative as project-generated traffic was added to base year volumes without accounting for the diversion.
- Traffic operations will be similar to Base Year 2005 conditions.

The following are the conclusions of the traffic study for Year 2006 with Phase 1 and Phase 2 of the project.

b. Year 2006 with Phase 1 and Phase 2

- Development of the project (Phase 1 and Phase 2) could potentially generate approximately 97 and 91 total trips during the AM and PM peak hours of traffic, respectively.
- Traffic operations will be similar to Base Year 2006 conditions.
- The Kula Highway/A'apueo Parkway intersection will be operating near capacity. Any additional traffic at this intersection may require eastbound double leftturn on A'apueo Parkway.

Recommendations

The following are the recommendations of the traffic study without project-generated traffic:

a. Without Project-Generated Traffic

Base Year 2005

- Install traffic signal systems at the Haleakala Highway/Old Haleakala Highway (western intersection) and Haleakala Highway/Makani Road intersections. Interconnect and synchronize these traffic signal systems with the existing traffic signals along Haleakala Highway at Makawao Avenue and the Five Trees Junction. Synchronization of these traffic signal systems may provide additional gaps in traffic on Kula Highway for turning movements on the minor approaches at the unsignalized Kula Highway/KKHS Driveway/Residential Driveway intersection.
- Install a traffic signal system at the Kula Highway/Aapueo Parkway intersection.

Base Year 2006

- Widen Haleakala Highway to four (4) lanes, with two
 (2) lanes in each direction, from the Haleakala Highway/Old Haleakala Highway (western intersection) to west of the Five Trees Junction.
- At the Haleakala Highway/Old Haleakala Highway (western intersection), provide a westbound acceleration lane on Haleakala Highway to receive northbound left-turns from Old Haleakala Highway. Provide traffic signal system phasing such that the westbound through traffic on Haleakala Highway and northbound left-turn traffic proceed through the intersection simultaneously. This would enable vehicles turning left from northbound Old Haleakala Highway onto westbound Haleakala Highway to accelerate and merge with traffic on Haleakala Highway further west of the intersection. The

westbound through vehicles would not be controlled by the traffic signal system and would be allowed to proceed continuously.

- Revise the traffic signal system at the Haleakala Highway/Makawao Avenue intersection to provide a protected left-turn phase for traffic on the minor street approaches.
- Adjust the traffic signal timing at the Five Trees
 Junction to be coordinated with the revised traffic
 signal system at the Haleakala Highway/Makani Road
 intersection.

The following are the recommendations of the traffic study with project-generated traffic:

b. With Project-Generated Traffic

Year 2005 with Phase 1

There are no specific recommendations of the traffic study with traffic generated by Phase 1 of the project.

Year 2006 with Phase 1 and Phase 2

There are no specific recommendations of the traffic study with traffic generated by Phase 2 of the project.

2. Water

Domestic water and fire flow for the region is provided by the County of Maui, Department of Water Supply's (DWS) public water system.

A new water system will be installed within the project site to provide water service for the project. The Preliminary Engineering Report for the proposed project indicates that preliminary water demand estimates reflect an average daily demand of approximately 2,200 gallons per day (gpd) and 6,200 gpd for Phases 1 and 2, respectively. Refer to Appendix "B".

The proposed project is not anticipated to adversely impact regional water service. Source, storage, and transmission facilities for the Kulamalu project area have been completed by its developer. Requirements and calculations for fire, domestic, and irrigation water service and use, as well as connection to the County's water system will be coordinated with the DWS as part of the project's building permit application review and approval process. In addition, water system improvements will be coordinated with the DWS to ensure that adequate supply is available at the time of development.

3. Wastewater

The Preliminary Engineering Report for the proposed project indicates that a new sewer system will be installed within the project site to provide sewer service for the project. Refer to Appendix "B". Preliminary wastewater contributions are calculated at approximately 2,000 gpd (average daily demand) and 5,500 gpd for Phases 1 and 2, respectively.

The proposed project is not expected to adversely impact the County's wastewater system, as there is no County wastewater collection system in the vicinity of the project site. See Appendix "B". Wastewater from the project will be accommodated by the privately operated Pukalani Terrace wastewater treatment facility.

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4. Drainage

The Preliminary Engineering Report for the proposed project notes that the project site will require excavation and embankment for the proposed buildings and parking lot for Phase 1. Refer to Appendix "B". In addition, the site will be graded to maintain the existing northwesterly drainage pattern and accommodate the future buildings and parking lot for Phase 2. An off-site retention basin will be installed to accommodate the post-development flow. New onsite drainage system improvements will involve the installation of grated drain inlets, manholes and underground drainlines.

Post-development flow from the project site is calculated at approximately 4.46 cfs and 7.25 cfs for Phases 1 and 2, respectively. Hydrology calculations are based on a 50 year - 1 hour storm recurrence interval. The proposed drainage system for the project site will be designed to maintain the predevelopment discharge rate and prevent adverse effect to the downstream properties.

Appropriate mitigative measures and Best Management Practices (BMPs) will be utilized during construction to minimize the effects of soil erosion and loss. In addition, all necessary drainage system improvements will be designed in accordance with the "Rules for the Design of Storm Drainage Facilities in the County of Maui" to ensure that the proposed drainage system will not adversely affect downstream and adjacent properties. In addition, a detailed drainage report and erosion control plan, including BMPs, will be submitted to the County of Maui, Department of Public Works and Waste Management for review and approval, in connection with the processing of building permit applications for the project.

5. Electrical, Telephone and CATV

Electrical, telephone, and cable television services for the proposed project will be coordinated with Maui Electric, Verizon Hawaii, and Hawaiian Cablevision, respectively.

F. CUMULATIVE AND SECONDARY IMPACTS

The proposed project is not expected to impact population parameters or result in an increased demand for public services and facilities, nor is it expected to create significant new demands for housing or infrastructure. During the short term, the project will benefit the economy, either directly and/or indirectly, through the payment of wages, salaries, benefits and taxes for employees involved in construction and construction-related jobs. In the long term, project employees will support the local economy through the contribution of taxes, and the purchase of goods and services from local businesses. In addition, the project will provide the support and infrastructure for advances in the fields of science and technology, as well as enable the IFA research faculty and staff to develop work practicum, apprentice and mentor programs with Maui Community College and the future University of Hawaii-Maui Campus. This would provide Hawaii students with job opportunities in the high-tech industry without having to leave the islands.

Chapter IV

B

Relationship to Governmental Plans, Policies and Controls

IV. RELATIONSHIP TO GOVERNMENT PLANS, POLICIES AND CONTROLS

A. STATE LAND USE DISTRICTS

The State Land Use Law, Chapter 205, Hawaii Revised Statutes (HRS), is intended to preserve, protect, and encourage the development of lands in the State for uses which are best suited to the public health and welfare for Hawaii's people. All lands in the State are classified into four (4) land use districts by the State Land Use Commission: "Urban", "Agricultural", "Conservation", and "Rural".

The project site is situated within the State Urban district. See Figure 7. The proposed action is compatible with, and permitted within the State Urban district.

B. HAWAII STATE PLAN

Chapter 226, HRS, also known as the Hawaii State Plan, is a long-range comprehensive plan which serves as a guide for the future long-term development of the State by identifying goals, objectives, policies, and priorities, as well as implementation mechanisms.

The proposed action is consistent with the following State Plan objective and policies.

ECONOMY

Objective:

 A steadily growing and diversified economic base that is not overly dependent on a few industries.

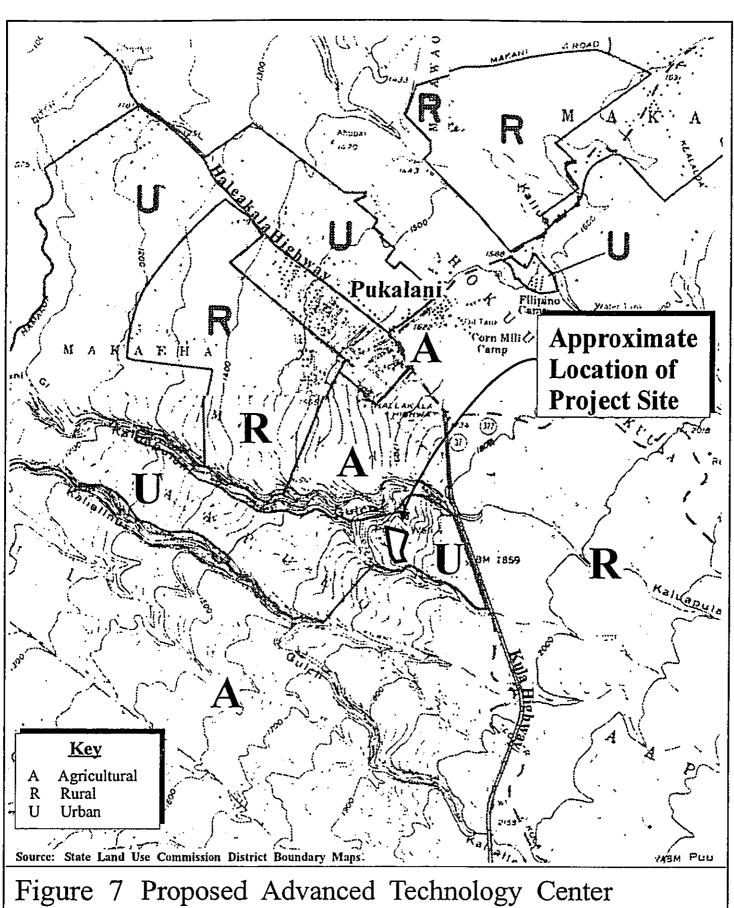


Figure 7 Proposed Advanced Technology Center and Advanced Technology Research Center State Land Use District Classifications

MUNEKIYO & HIRAGA, INC.

Prepared for: University of Hawaii, Institute for Astronomy

Policies:

- Expand existing markets and penetrate new markets for Hawaii's goods and services.
- Promote federal use of local commodities, services and facilities available in Hawaii.
- Enhance and promote Hawaii's role as a center for international relations, trade, finance, services, technology, education, culture and the arts.
- Promote Hawaii's geographic, environmental, social and technological advantages to attract new economic activities into the State.
- Develop, promote and support research, educational and training programs that will enhance Hawaii's ability to attract and develop economic activities of benefit to Hawaii.

C. MAUI COUNTY GENERAL PLAN

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help the long-range development of the County. As stated in the Maui County charter, "The purpose of the General Plan is to recognize and state the major problems and opportunities concerning the needs and development of the County and the social, economic, and environmental effects of such development and set forth the desired sequence, patterns and characteristics of future development."

The proposed action is in consonance with the following General Plan objectives and policies.

LAND USE

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Objective:

 To use the land within the County for the social and economic benefit of all the County's residents.

ECONOMY

Objective:

 To provide an economic climate which will encourage controlled expansion and diversification of the County's economic base.

Policies:

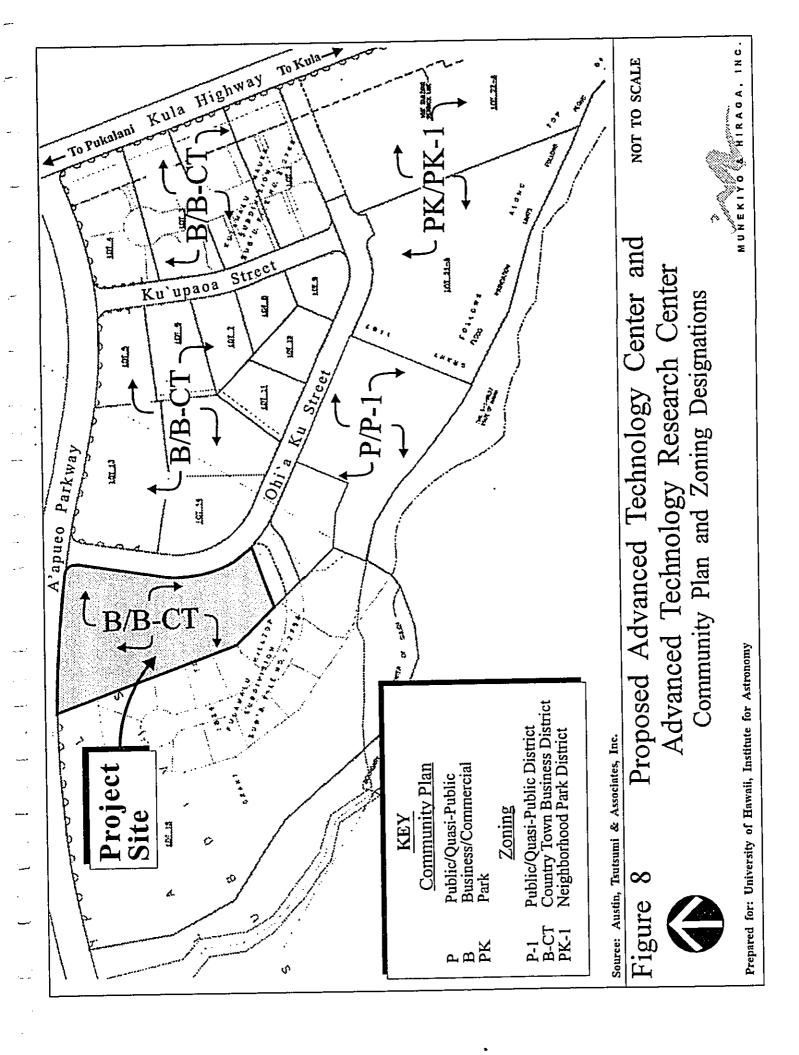
- Maintain a diversified economic environment compatible with acceptable and consistent employment.
- Support programs, services and institutions which provide economic diversification.

D. <u>MAKAWAO-PUKALANI-KULA COMMUNITY PLAN</u>

The project site is located within the Makawao-Pukalani-Kula Community Plan region, one (1) of nine (9) community plan regions established in the County of Maui. Planning for each region is guided by the respective community plans, which are designed to implement the Maui County General Plan. Each community plan sets forth desired land use patterns, as well as goals, objectives, policies and implementing actions for development within the region.

The lands underlying the project site are designated for "Business/Commercial" uses by the Makawao-Pukalani-Kula Community Plan (1996). See Figure 8. In December 1997, the Maui County Council approved amendments to the community plan land use map to reflect minor changes concerning the location of land uses within the project area.

From a community plan land use perspective, the proposed project is in keeping with the uses designated for the site by the Makawao-Pukalani-



Kula Community Plan and is in consonance with the following goals, objectives and policies of the community plan.

Goals:

- A stable and diverse economic environment which supports
 a level of community prosperity in order to provide social
 services and environmental amenities and which respects
 the region's rural and agricultural lifestyle, open space and
 natural resources.
- The maintenance and enhancement of Upcountry's unique and diverse rural land use character with sensitivity to existing land use patterns, natural resource values and economic and social needs of the region's residents.
- Recognition and preservation of the unique design characteristics of the Makawao, Pukalani and Kula communities in order to enhance Upcountry's man-made environment.

Objectives and Policies:

- Encourage commercial building scales which are compatible with the low-scale character of existing commercial structures.
- Preserve the unique characteristics of all of the Upcountry towns by recognizing and respecting architectural styles as described in the Country Town Design Guidelines.
- Enforce a two-story or 35-foot height limitation throughout the region, except for public/quasi-public uses such as auditoriums, gymnasiums and fire stations.

E. ZONING

Permitted uses and performance standards are promulgated by Chapter 19 of the Maui County Code (MCC) pertaining to zoning.

The project site is zoned for Country Town Business District uses by the County of Maui. Refer to Figure 8. The intent of this zoning district is to establish development standards for businesses in the rural communities.

Principal permitted uses within the Country Town Business District include buildings and premises utilized by government agencies; amusement activities and printing establishments within enclosed buildings; automobile service stations; auditoriums and theaters; bakeries; businesses, financial and professional offices; commercial retail; personal service; and eating and drinking establishments; educational, trade and certain types of personal skills schools; fitness centers and dancing studios; hardware, feed and garden stores; laundromats; music studios; parking lots; religious, benevolent, philanthropic societies and civic organizations; bed and breakfast homes (subject to MCC provisions); and accessory uses and structures necessary to facilitate the establishment of principal permitted uses.

The proposed project is in concert with the County Town Business District zoning for the project site.

F. COASTAL ZONE MANAGEMENT OBJECTIVES AND POLICIES

The Hawaii Coastal Zone Management Program (HCZMP), as formalized in Chapter 205A, HRS, establishes objectives and policies for the preservation, protection and restoration of natural resources of Hawaii's coastal zone.

As set forth in Chapter 205A, HRS, this section addresses the project's relationship to applicable coastal zone management considerations.

1. Recreational Resources

<u>Objective</u>: Provide coastal recreational opportunities accessible to the public.

Policies:

- a. Improve coordination and funding of coastal recreational planning and management; and
- b. Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:
 - (i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;
 - (ii) Requiring replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the state for recreation when replacement is not feasible or desirable;
 - (iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;
 - (iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;
 - (v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;
 - (vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;
 - (vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and
 - (viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the

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land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of Section 46-6, HRS.

<u>Response</u>: The proposed action is not anticipated to impact coastal recreational opportunities or affect existing public access to the shoreline. The project is designed to provide needed space and state-of-the art instrumentation, as well as clean room facilities to adequately support the IFA's rapidly growing high-tech research programs, and accordingly, is not a direct generator of, nor does it create a demand for, regional recreational resources.

2. <u>Historical/Cultural Resources</u>

Objective: Protect, preserve and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:

- a. Identify and analyze significant archeological resources;
- b. Maximize information retention through preservation of remains and artifacts or salvage operations; and
- c. Support state goals for protection, restoration, interpretation, and display of historic resources.

Response: The project site, which was previously utilized as pasture, has recently been disturbed in connection with mass grading for the Kulamalu Town Center Subdivision. The archaeological surveys of the Kulamalu project area did not locate any archaeological sites or cultural artifacts at the project site. Should human remains be inadvertently discovered during earth moving activities, work shall cease at once in the immediate area of the find, and the find shall be protected from further disturbance.

The State Historic Preservation Division shall also be immediately notified and procedures for the treatment of inadvertently discovered human remains shall be followed pursuant to Chapter 6E, HRS.

3. <u>Scenic and Open Space Resources</u>

<u>Objectives:</u> Protect, preserve and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

- a. Identify valued scenic resources in the coastal zone management area;
- b. Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;
- c. Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and
- d. Encourage those developments that are not coastal dependent to locate in inland areas.

Response: The proposed improvements will be designed and landscaped in accordance with applicable regulatory standards to ensure visual compatibility with the surrounding land uses. The proposed action is not contrary to the objectives and policies for scenic and open space resources.

4. <u>Coastal Ecosystem</u>

<u>Objective</u>: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

a. Exercise an overall conservation ethic, and practice

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- stewardship in the protection, use, and development of marine and coastal resources:
- b. Improve the technical basis for natural resource management;
- c. Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;
- d. Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and
- e. Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Response: The proposed action is not expected to adversely impact coastal ecosystems. Drainage system improvements will be designed in accordance with applicable regulatory standards to ensure that there are no adverse effects to adjacent or downstream properties.

In addition, appropriate erosion control measures will be implemented to minimize the effects of stormwater runoff during construction of the project and to ensure that coastal ecosystems are not adversely impacted.

5. Economic Use

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

- a. Concentrate coastal dependent development in appropriate areas:
- Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor

facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

- c. Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:
 - (i) Use of presently designated locations is not feasible:
 - (ii) Adverse environmental effects are minimized; and
 - (iii) The development is important to the State's economy.

<u>Response</u>: The proposed project is consistent with the goals of the Makawao-Pukalani-Kula Community Plan, which guides growth and development in the region.

6. Coastal Hazards

Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence and pollution.

Policies:

- a. Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;
- b. Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint pollution hazards;
- c. Ensure that developments comply with requirements of the Federal Flood Insurance Program; and
- d. Prevent coastal flooding from inland projects.

<u>Response</u>: The project site falls within Zone C, an area of minimal flooding. Drainage improvements will be designed in accordance with the Drainage Standards of the County of Maui to ensure that the project will not adversely affect downstream and adjoining

properties from the effects of flooding and erosion.

7. Managing Development

<u>Objective</u>: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

a. Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

b. Facilitate timely processing of applications for development permits and resolve overlapping of conflicting permit

requirements; and

c. Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Response: This Environmental Assessment has been prepared for public review in compliance with Chapter 343, HRS, and Chapter 200 of Title 11, Administrative Rules, *Environmental Impact Statement Rules*.

In addition, all aspects of development will be conducted in accordance with applicable State and County requirements. Opportunity for review of the proposed action is offered through the various regulatory permit processes.

8. Public Participation

Objective: Stimulate public awareness, education, and participation in coastal management.

Policies:

a. Promote public involvement in coastal zone management

processes;

- b. Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and
- c. Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

<u>Response:</u> Opportunities for public awareness, education, and participation in coastal management are provided through the environmental review process.

9. Beach Protection

Objective: Protect beaches for public use and recreation.

Policies:

- a. Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;
- b. Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and
- c. Minimize the construction of public erosion-protection structures seaward of the shoreline.

Response: At its closest point, the subject property is located approximately 8.0 miles from the shoreline and is not anticipated to impact shoreline processes.

10. Marine Resources

Objective:

Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies:

a. Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

b. Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;

 Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

d. Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

e. Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

<u>Resources:</u> Best Management Practices (BMP's) will be incorporated during construction to support the policies of effective management of marine resources.

It is noted that the project site is not located within the boundaries of the County of Maui's Special Management Area.

Chapter V

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Summary of Adverse Environmental Effects Which Cannot Be Avoided

V. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The proposed development will result in unavoidable construction-related impacts as described in Chapter III, Potential Impacts and Mitigation Measures.

Potential effects include noise-generated impacts occurring from site preparation and construction activities. In addition, there may be temporary air quality impacts associated with dust generated from construction activities, and exhaust discharged by construction equipment. It should be noted, however, that these impacts are expected to be minimized through the implementation of the appropriate mitigative measures identified in Chapter III.

The proposed project is not anticipated to create any significant, long-term adverse environmental effects.

Chapter VI

Alternatives to the Proposed Action

VI. ALTERNATIVES TO THE PROPOSED ACTION

A. NO ACTION AND DEFERRED ACTION ALTERNATIVES

The proposed project involves the development of an Advanced Technology Center (ATC) and an Advanced Technology and Research Center (ATRC), as well as related improvements. The ATC will replace the IFA's existing Waiakoa Laboratory in Kula, which lacks the office and laboratory space to sufficiently support the IFA's quickly growing high-tech research programs, while the ATRC will contain additional space for ATC uses, as well as provide research facilities which will support the University of Hawaii's general research programs.

The "no action" alternative would maintain the existing physical condition of the project site until an alternative Country Town Business use is identified for development at the property. When considering the land use context for the subject property, the "no action" alternative does not support the highest and best use of the property as reflected by the Makawao-Pukalani-Kula Community Plan (Business/Commercial) and Maui County zoning (Country Town Business) land use designations for the site. Accordingly, the "no action" alternative was not considered.

A "deferred action" alternative would have similar consequences as the "no action" alternative in that the land use objectives of the proposed project would be delayed and would not be immediately realized.

This alternative could result in potentially higher development costs due to increases in labor and material costs or as a result of changes to infrastructure or the existing physical or socio-economic environment (i.e., window of opportunity and opportunity costs). Based on the preceding, the "deferred action" alternative was not considered.

B. SITE PLAN ALTERNATIVES

During the project's site planning phase, the IFA's operational requirements for the proposed facilities were examined to ensure that spatial and functional criteria for the project were adequately addressed. The site planning process involved an analysis of space needs, missions and functions, area requirements, spaces and adjacencies, and people equipment activities schedule, and space relationships and layouts. Through the project's planning process, a site plan was prepared and reviewed to ensure that all operational and performance standards can be addressed.

Chapter VII

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Irreversible and Irretrievable Commitments of Resources

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The development of the proposed project is anticipated to result in the irreversible and irretrievable commitment of land and fiscal resources. Other resource commitments include energy, labor, and material resources. Impacts relating to the use of these resources should be weighed against the expected positive socio-economic benefits to be derived from the project versus the consequences of taking no action.

In addition, the proposed project is not anticipated to require a substantial commitment of government services or facilities. In general, the proposed action is not anticipated to place significant additional requirements on police, fire, medical, and social services.

Chapter VIII

Findings and Conclusions

VIII. FINDINGS AND CONCLUSIONS

The "Significance Criteria", Section 12 of the Administrative Rules, Title 11, Chapter 200, "Environmental Impact Statement Rules", were reviewed and analyzed to determine whether the proposed project will have significant impacts to the environment. The following analysis is provided:

1. No Irrevocable Commitment to Loss or Destruction of any Natural or Cultural Resource Would Occur as a Result of the Proposed Project

The proposed project will not result in any adverse environmental impacts. There are no known, rare, threatened or endangered species of flora, fauna or avifauna located within the project site.

The project site was formerly used for pasture and has been recently disturbed in connection with mass grading for the Kulamalu Town Center Subdivision. The archaeological surveys of the Kulamalu project area (including the project site) did not locate any archaeological sites or cultural artifacts at the project site. Should any cultural artifacts or human remains be encountered during construction, work will immediately stop in the vicinity of the find and the find will be protected from further disturbance. The State Historic Preservation Division will be immediately notified to establish an appropriate mitigation strategy.

2. <u>The Proposed Action Would Not Curtail the Range of Beneficial Uses</u> of the Environment

The proposed project and the commitment of land resources would not curtail the range of beneficial uses of the environment.

3. The Proposed Action Does Not Conflict with the State's Long-term Environmental Policies or Goals or Guidelines as Expressed in Chapter 344, Hawaii Revised Statutes

The State's Environmental Policy and Guidelines are set forth in Chapter 344, Hawaii Revised Statutes. The proposed action is in consonance with the policies and guidelines.

4. The Economic or Social Welfare of the Community or State Would Not be Substantially Affected

The proposed project would have a direct beneficial effect on the local economy during construction. In the long term, the proposed project will support the local economy through the contribution of salaries, wages, and benefits, as well as through the purchases of goods and services from local merchants and service providers.

5. The Proposed Action Does Not Affect Public Health

No impacts to the public's health and welfare are anticipated as a result of the proposed project.

6. <u>No Substantial Secondary Impacts, Such as Population Changes or</u> Effects on Public Facilities are Anticipated

No significant population changes are anticipated as a result of the proposed project.

From a land use standpoint, the proposed project is compatible with the business/commercial uses set forth for the property by the Makawao-Pukalani-Kula Community Plan and Maui County zoning.

The proposed project is not expected to adversely impact existing water and wastewater systems and facilities. Best Management Practices

(BMP's) and appropriate erosion control measures will be utilized during the construction period. Drainage system improvements will be constructed in accordance with applicable regulatory design standards to ensure that surface runoff will not have an adverse effect on adjacent or downstream properties. The project is not expected to significantly impact public services such as police, fire, and emergency medical operations. No adverse impacts to educational, recreational, and solid waste collection and disposal facilities and resources are anticipated.

7. No Substantial Degradation of Environmental Quality is Anticipated
During the construction phase of the project, there will be short-term air
quality and noise impacts as a result of the project. In the long term,
effects upon air quality and ambient noise levels should be minimal. The
project is not anticipated to significantly affect the open space and scenic
character of the area.

No substantial degradation of environmental quality resulting from the project is anticipated.

8. <u>The Proposed Action Does Not Involve a Commitment to Larger Actions, Nor Would Cumulative Impacts Result in Considerable Effects on the Environment</u>

The proposed project does not involve a commitment to larger actions.

9. No Rare, Threatened or Endangered Species or Their Habitats Would be Adversely Affected by the Proposed Action

There are no rare, threatened or endangered species of flora, fauna, avifauna or their habitats on the subject property.

10. <u>Air Quality, Water Quality or Ambient Noise Levels Would Not be</u> Detrimentally Affected by the Proposed Project

Construction activities will result in short-term air quality and noise impacts. Dust control measures, such as regular watering and sprinkling, will be implemented to minimize wind-blown emissions. Noise impacts will occur primarily from construction-related activities. It is anticipated that construction will be limited to daylight working hours. Water quality is not expected to be affected.

In the long term, the project is not anticipated to have a significant impact on air and water quality or ambient noise levels.

11. The Proposed Project Would Not Affect Environmentally Sensitive Areas, Such as Flood Plains, Tsunami Zones, Erosion-prone Areas, Geologically Hazardous Lands, Estuaries, Fresh Waters or Coastal Waters

The project is not located within and would not affect environmentally sensitive areas. The project site is not subject to flooding or tsunami inundation. Soils of the project site are not erosion-prone. There are no geologically hazardous lands, estuaries, or coastal waters within or adjacent to the project site.

12. <u>The Proposed Action Would Not Substantially Affect Scenic Vistas</u> and Viewplanes Identified in County or State Plans or Studies

The project site is not identified as a scenic vista or viewplane. The proposed project will not affect scenic corridors and coastal scenic and open space resources.

13. <u>The Proposed Action Would Not Require Substantial Energy</u> <u>Consumption</u>

The proposed project will involve the short-term commitment of fuel for

equipment, vehicles, and machinery during construction activities. However, this use is not anticipated to result in a substantial consumption of energy resources. In the long term, the project will create an additional demand for electricity. However, this demand is not deemed substantial or excessive within the context of the region's overall energy consumption.

Based on the foregoing findings, it is concluded that the proposed action will not result in any significant impacts.

Chapter IX

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List of Permits and Approvals

IX. LIST OF PERMITS AND APPROVALS

The following permits and approvals will be required prior to the implementation of the project.

State of Hawaii

- 1. Community Noise Permit (as applicable)
- 2. NPDES Permit

County of Maui

1. Construction Permits (e.g., grading, building, driveway, electrical, plumbing)

Chapter X

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Agencies Consulted During the Preparation of the Draft Environmental Assessment; Letters Received and Responses to Substantive Comments

X. AGENCIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

The following agencies were consulted during the preparation of the Draft Environmental Assessment. Agency comments and responses to substantive comments are also included in this section.

- Neal Fujiwara, Soil Conservationist
 Natural Resources Conservation Service
 U.S. Department of Agriculture
 210 Imi Kala Street, Suite 209
 Wailuku, Hawaii 96793-2100
- George Young, P.E.
 Chief, Regulatory Branch
 U.S. Department of the Army
 U.S. Army Engineer District, Hnl.
 Attn: CEPOH-EC-R
 Bldg. 230, Room 201
 Fort Shafter, Hawaii 96858-5440
- Robert P. Smith
 Pacific Islands Manager 9.
 U. S. Fish and Wildlife Service
 300 Ala Moana Blvd., Rm. 3-122, Box
 50088
 Honolulu, Hawaii 96813
- 4. Sandra Lee Kunimoto, Chairman State Of Hawaii

 Department of Agriculture
 1428 South King Street
 Honolulu, Hawaii 96814-2512
- Micah Kane, Chairman
 State of Hawaii
 Department of Hawaiian Home Lands
 P.O. Box 1879
 Honolulu, Hawaii 96805
- 6. Chiyome L. Fukino M.D., Director State of Hawaii

 Department of Health
 P.O. Box 3378

 Honolulu, Hawaii 96801

Herbert Matsubayashi
District Environmental Health
Program Chief
State of Hawaii
Department of Health
54 High Street
Wailuku, Hawaii 96793

Peter T. Young, Director
State of Hawaii
Department of Land and Natural
Resources
P. O. Box 621
Honolulu, Hawaii 96809

- P. Holly Mc Eldowney, Acting Administrator State of Hawaii Department of Land and Natural Resources State Historic Preservation Division 601 Kamokila Blvd., Room 555 Kapolei, Hawaii 96707
- 10. Fred Cajigal, Maui District Engineer State of Hawaii Department of Transportation Highways Division 650 Palapala Drive Kahului, Hawaii 96732
- Clyde Namu'o, Administrator
 Office of Hawaiian Affairs
 711 Kapiolani Boulevard, Suite 500
 Honolulu, Hawaii 96813
- 12. Richard Fernandez, Chief
 County of Maui
 Department of Fire Control
 200 Dairy Road
 Kahului, Hawaii 96732

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13.	Alice Lee, Director County of Maui Department of Housing and Human Concerns 200 S. High Street Wailuku, Hawaii 96793	22.	Lynn Woods, Executive Director Maui Chamber of Commerce 250 Alamaha Street, Suite N16A Kahului, Hawaii 96732	
14.	Michael W. Foley, Director County of Maui Department of Planning 250 South High Street Wailuku, Hawaii 96793			
15.	Glenn Correa, Director County of Maui Department of Parks and Recreation 1580-C Kaahumanu Avenue Wailuku, Hawaii 96793			
16.	Tom Phillips, Chief County of Maui Police Department 55 Mahalani Street Wailuku, Hawaii 96793			
17.	Gilbert Coloma-Agaran, Director County of Maui Department of Public Works and Waste Management 200 South High Street Walluku, Hawaii 96793			
18.	George Tengan, Director County of Maui Department of Water Supply 200 South High Street Wailuku, Hawaii 96793			• -
19.	Lynn Araki-Reagan, Coordinator County of Maui Office of Economic Development 200 South High Street Wailuku, Hawaii 96793			• •••
20.	Honorable Charmaine Tavares Councilmember Maui County Council 200 South High Street Wailuku, Hawaii 96793			<u>~</u> -
21.	Ms. Elliott Krash Kula Community Association P.O. Box 417 Kula, Hawaii 96790			

JAMES "KIMO" APANA Mayor

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FLOYD S. MIYAZONO
Director

GLENN T. CORREA Deputy Director

(808) 270-7230 Fax (808) 270-7934

DEPARTMENT OF PARKS & RECREATION

1580-C Kaahumanu Avenue, Wailuku, Hawaii 96793

July 31, 2002

Glenn Tadaki, Planner Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Tadaki:

SUBJECT: PROPOSED ADVANCED TECHNOLOGY CENTER AND

ADVANCED TECHNOLOGY RESEARCH CENTER

TMK 2-3-08:38 and 39 (por.)

Thank you for the opportunity to review the summary of the subject project. At this time, we have no comments or objections to the proposed action.

Please contact me or Mr. Patrick Matsui, Chief of Parks Planning and Development, at 270-7387 if there are any questions.

Sincerely,

Patrick Matsui, Chief of Planning and Development



JAMES "KIMO" APAN,"
Mayo
ALICE L.LEE
Director
PRISCILLA!! MIKEL!"
Deputy Directo

200 SOUTH HIGH STREET • WAILUKU, HAWAII 96793 • PHONE (808) 270-7805 • FAX (808) 270-7165

August 2, 2002

Mr. Glenn Tadaki, Planner Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Tadaki:

SUBJECT: PROPOSED ADVANCED TECHNOLOGY CENTER AND ADVANCED TECHNOLOGY RESEARCH CENTER,

TMK: 2-3-08:38 and 39(POR.)

We have reviewed the project summary that was attached to your July 26, 2002 letter and wish to inform you that we have no comment to offer.

Thank you for the opportunity to comment.

Very truly yours

ALICE L. LEE Director

ETO:hs

c: Housing Administrator



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DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

August 7, 2002

Regulatory Branch

Mr. Glenn Tadaki, Planner Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Tadaki:

This responds to your written request for review comments on the Environmental Assessment preparation notice for University of Hawaii Institute for Astronomy development of an Advanced Technology Center and Advanced Technology Research Center on a 3.4-acre site within the Kulamalu Commercial Subdivision in Kula, Maui (TMK 2-3-08: 38 and por. 39). We have reviewed the document with respect to the Corps' authority to issue Department of the Army (DA) permits under Section 10 of the River and Harbor Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344).

The project summary you provided does not contain sufficient information to enable determination of DA permit requirements. Any activity which would involve the discharge of dredged or fill material below the ordinary high water mark of Kaluapulani Gulch or its unnamed tributaries, or into adjacent wetlands, may require a DA permit. We can provide a determination of DA permit requirements for the project when it is further delineated with respect to these or other water bodies which may be present.

File number 200200457 has been assigned to this project. Should you have questions regarding these comments, please contact Mr. Peter Galloway of my staff at 438-8416 (fax 438-4060). Mailed inquiries should be addressed to: Regulatory Branch (CEPOH-EC-R/P. Galloway); U.S. Army Engineer District, Honolulu; Building 230; Fort Shafter, Hawaii 96858-5440. Thank you for working with the U.S. Army Corps of Engineers in protecting the aquatic resources of Hawaii.

Sincerely,

Chief, Regulatory Branch



JAMES "KIMO" APANA

MAYOR

OUR REFERENCE

ty YOUR REFERENCE

POLICE DEPARTMENT

COUNTY OF MAUI

55 MAHALANI STREET WAILUKU, HAWAII 96793 (808) 244-6400 FAX (808) 244-6411

August 9, 2002



THOMAS M. PHILLIPS CHIEF OF POLICE

KEKUHAUPIO R. AKANA DEPUTY CHIEF OF POLICE ---

Mr. Glenn Tadaki Planner Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, HI 96793

Dear Mr. Tadaki:

SUBJECT: Proposed Advanced Technology Center and Advanced Technology Research Center TMK 2-3-08:38 and 39 (por.)

Thank you for your letter of July 26, 2002, requesting comments on the above subject.

The assessment was reviewed and we have no additional comments or recommendations at this time. Thank you for giving us the opportunity to comment on this project. We are returning the summary which was submitted for our review.

Very truly yours,

Assistant Chief Robert Tam Ho for: Thomas M. Phillips

Chief of Police

Enclosure

c: John E. Min, Planning Department

JAMES "KIMO" APANA Mayor

DAVID C. GOODE Director

MILTON M. ARAKAWA, A.I.C.P. Deputy Director

Telephone: (808) 270-7845 Fax: (808) 270-7955

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DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT

200 SOUTH HIGH STREET WAILUKU, MAUI, HAWAII 96793

August 14, 2002

RALPH NAGAMINE, L.S., P.E. Land Use and Codes Administration

TRACY TAKAMINE, P.E. Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E. Engineering Division

BRIAN HASHIRO, P.E. Highways Division

JOHN D. HARDER Solid Waste Division

Mr. Glenn Tadaki MUNEKIYO & HIRAGA, INC. 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Tadaki

SUBJECT:

EARLY CONSULTATION FOR ENVIRONMENTAL ASSESSMENT

UNIVERSITY OF HAWAII - INSTITUTE FOR ASTRONOMY

TECHNOLOGY CENTER TMK: (2)2-3-008:038, 039

We have reviewed the early consultation transmitted for the subject Environmental Assessment and have the following comments:

- 1. Submit a plan for construction waste disposal and recycling and cleared and grubbed disposal and composting.
- 2. The project shall comply with the provisions of Title 18, Maui County Code (MCC), Subdivisions; Chapter 20.08, MCC, Grading Ordinance and Maui County Drainage Rules.

If you have any questions regarding this letter, please call Milton Arakawa at 270-7845.

Sincerely,

DAVID GOODE

Director

DG:RGM:msc s:\Luca\czM\UH-astronomytechctr.wpd

Quality Seamless Service - Now and for the Future



April 10, 2003

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Gilbert Coloma-Agaran, Director
Department of Public Works
and Environmental Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Proposed Advanced Technology Center and Advanced Technology and Research Center; TMK 2-3-08: 38 and 39 (por)

Dear Mr. Coloma-Agaran:

On behalf of the applicant, the University of Hawaii, Institute for Astronomy, we would like to note the following in response to your department's August 26, 2002 early consultation comments on the proposed project.

Construction waste disposal and recycling will be the responsibility of the contractor. Provisions for the disposal of construction waste and recycling will be noted in the project's construction plans. In addition, the project will be developed in accordance with the applicable provisions of the Maui County Code and Maui County Drainage Rules ertaining to subdivisions, grading, and drainage.

Please feel free to call me should you have any questions.

Very truly yours,

Glenn Tadaki, Planner

GT:yp

cc: Michael Maberry, University of Hawaii, Institute for Astronomy

Don Fujimoto, Kulamalu Science, LLC

dowling/astronmy/dpwom.res

planning environment --

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8/29 · planning@mhinconline.com.

PHONE (808) 594-1888



STATE OF HAWAI'I **OFFICE OF HAWAIIAN AFFAIRS** 711 KAPI'OLANI BOULEVARD, SUITE 500 HONOLULU, HAWAII 96813

HRD 02-690

FAX (808) 594-1665

Date: August 15, 2002

Glenn Tadaki, Planner To:

> Munekiyo & Hiraga, Inc. 305 South High Street

Suite 104

Wailuku, HI 96793

Subject:

Proposed Advanced Technology Center and Advanced Technology

Research Center

Kulamalu Commercial Subdivision

District, Island:

Kula, Maui

TMK:

2-3-08:38 and 39 (por)

Thank you for the opportunity to review the Project Summary for the Proposed Advanced Technology Center and Advanced Technology Research Center.

The Office of Hawaiian Affairs offers no comment on the single-paged project summary. However, OHA anticipates receiving your Environmental Assessment (EA) for the project and reserves comment subsequent to our review of your archaeological survey and cultural resource inventory

You may direct any questions or comments to Aulani Apoliona at 594-1962.

Sincerely,

Jalna Keaia

Acting Hawaiian Rights Director

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KULA COMMUNITY ASSOCIATION P.O. Box 41 - Kuia, HI 96780

http://kulemaul.com

The vision of the Kula Community Association is to preserve open apece, support agriculture, maintain a rural residential etmosphere, and to work together as a community.

The specific purpose of this association is to improve the quality of Sie for the residents of Kula, to promote civic wetters and generally to benefit the community of Kula.

August 18, 2002

Mr. Glenn Tadaki, Ptanner Muneklyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, HI 96793

Subject:

University of Hawaii, Institute for Astronomy (IFA) Advanced Technology Center (ATC) and Advanced Technology Research Center (ATRC), Kulamalu Commercial Subdivision, Kula, Maul

Dear Mr. Tadaki:

Thank you for inviting the comments of the Kula Community Association (KCA) on the proposed IFA Centers at the Kulamalu Commercial Subdivision in Kula, Maui. We are aware of the limitations of the current site in Walakoa and the need for a new state-of-the-art facility. We also understand that the project is planned to be completed in two phases, with construction of the ATC scheduled to begin in 2003 and completion estimated for mid 2004.

The KCA Board of Directors supports the current proposals for the Kulamatu project as presented by Mr. Dowling at a recent KCA Board Meeting. His vision of Kulamatu is a small, country town with mixed uses including single and multifamily residential, parks and open space, research, technology, education, services, and family-oriented businesses and activities. This is also congruent with the Kulamatu "Country-Town Business" project as outlined in the <u>Pukalant-Makawao-Kula Community Plan</u>.

The proposed IFA project is conceptually consistent with the Kulamalu plan. For the vision to become reality, however, many details must be resolved. Listed below are a few of the issues we would expect to be satisfactorily addressed in the Environmental Assessment (EA) and other phases of the project.

- The EA should analyze traffic related lasues such as employee and visitor car trips, truck and other vehicle traffic, hours of operation, and noise generation. The impact of such activities on the Kula Highway and other nearby roads and should be studied for the eventual build-out and use of the facility.
- The proposed project will consist of two large buildings and parking for almost 200 cars on a lot of less than
 three and a half acres. Therefore, it is essential that the buildings and parking areas be planned, arranged,
 and constructed on the site in such a way as to not have an adverse impact on the aesthetics and scenic
 vistas of the general area. The building shapes, exterior materials, landscaping, and color schemes should
 be chosen to reflect the country town atmosphere.
- The concerns and comments of all residents and businesses in the area should be addressed in the EA.
 The public hearings and meetings to hear residents' concerns should be held in Pukaiani or Kula and preferably in the evenings to make it convenient for Upcountry residents to attend.

We hope our comments are helpful in preparing the EA. Should you want to discuss them further or arrange a meeting, please call either our KCA Planning Committee chair Harl Almani (878-3702) or me (878-1342). We look forward to continuing participation in the process as the project progresses.

Yours truly,

Elliott Krash, President

Cc: Alan AhSam, University of Hawali Don Fujimoto, Kulamalu Science LLC



April 10, 2003

Elliott Krash, President **Kula Community Association** P.O. Box 41 Kula, Hawaii 96790

SUBJECT:

Proposed Advanced Technology Center and Advanced Technology

Research Center; TMK 2-3-08: 38 and 39 (por.)

Dear Mr. Krash:

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Thank you for providing us with your August 18, 2002 early consultation comments on the proposed project. On behalf of the applicant, the University of Hawaii, Institute for Astronomy, we would like to note the following.

The Draft Environmental Assessment (EA) will include information on project-related traffic, as well as assess traffic-related impacts. The layout of the project's onsite facilities will be designed to complement the surrounding area; buildings will be designed in accordance with Country Town Design Guidelines. A community information meeting is planned during the Draft EA public comment period.

Please feel free to call me should you have any questions.

Very truly yours,

Glerin Tadaki, Planner

GT:yp

Michael Maberry, University of Hawaii, Institute for Astronomy

Don Fujimoto, Kulamalu Science, LLC

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BENJAMIN J. CAYETANO GOVERNOR



BRUCE S. ANDERSON: Ph.D., M.P.H. DIRECTOR OF HEALTH

> LORRINW. PANG, M.O., M.P.H. MAUL DISTRICT HEALTH OFFICER

STATE OF HAWAII

DEPARTMENT OF HEALTH

MAUI DISTRICT HEALTH OFFICE

54 HIGH STREET

WAILUKU, MAUI, HAWAII 96793

August 19, 2002

Mr. Glenn Tadaki Planner Munekiyo & Hiraga, Inc. 305 South High Street, Suite 104 Wailuku, Hawai'i 96793

Dear Mr., Tadaki:

Subject:

Proposed Advanced Technology Center and Advanced

Technology Research Center TMK: (2) 2-3-08:38 and 39 (por.)

Thank you for the opportunity to participate in the environmental early consultation process for the proposed technology and research center. Comments from this office were transmitted to our Honolulu Office. A coordinated response is forthcoming.

Should you have any questions, please call me at 984-8230.

Sincerely,

Herbert S. Matsubayashi

District Environmental Health Program Chief

c: Lance Tauoa

GOVERNOR

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STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

MAUI DISTRICT 650 PALAPALA DRIVE KAHULUI, HAWAII 96732

August 19, 2002

OEL A 4 CANC 19 BRIAN K. MINAAI DIRECTOR

DEPUTY DIRECTORS JEAN L. OSHITA JADINE Y. URASAKI

IN REPLY REFER TO:

HWY-M2.271-02

MEMORANDUM

TO:

Glenn Tadaki

Munekiyo & Arakawa, Inc.

FROM:

Paul M. Chung

State Highways \

SUBJECT: Advanced Technology Research Center

ME 02-42

Thank you for the opportunity to review and comment on the proposed Astronomy Research Center within the Kulamalu Commercial Subdivision. Based upon our review of the proposal, please include a Traffic Impact Analysis Report when preparing the Environmental Assessment.

If there are any questions or concerns, please call me at 873-3535.

/pmc



April 10, 2003

Paul Chung Highways Division, Maui District **Department of Transportation** State of Hawaii 650 Palapala Drive Kahului, Hawaii 96732

> Proposed Advanced Technology Center and Advanced Technology SUBJECT: Research Center; TMK 2-3-08: 38 and 39 (por.)

Dear Mr. Chung:

Thank you for providing us with your August 19, 2002 early consultation comments on the proposed project. On behalf of the applicant, the University of Hawaii, Institute for Astronomy, we would like to note that a traffic study will be included in the project's Draft Environmental Assessment (EA).

Please feel free to call me should you have any questions.

Very truly yours,

Glenn Tadaki, Planner

GT:yp

Michael Maberry, University of Hawaii, Institute for Astronomy Don Fujimoto, Kulamalu Science, LLC

dowling/astmomy/dot.res

305 High Street, Suite 104. Wailuku, Hawaii 96793. ph: (808)244-2015. fax: (608)244-8729. planning@mhinconline.com.



DEPARTMENT OF WATER SUPPLY COUNTY OF MAUI

P.O. BOX 1109 WAILUKU, MAUI, HAWAII 96793-6109 Telephone (808) 243-7816 • Fax (808) 243-7833

August 26, 2002

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Glenn Tadaki, Planner Munekiyo & Hiraga, Inc. 305 High, Suite 104 Wailuku, Hawaii 96793 Ph: (808) 244-2015 Fax (808) 244-8729

Rc:

Project:Proposed Advanced Technology Center and Advanced Technology

Research Center - Early Consultation for Environmental Assessment

TMK:

2-3-08:038, 039

Dear Mr. Glenn Tadaki:

Thank you for the opportunity to review this proposal. The following comments are made in reference to the proposed Advanced Technology Center and Advanced Technology Research Center on 3.4 acre parcel within the Kulamalu Commercial Subdivision in Kula, Maui: TMK: 2-3-08:038,039. The Kulamalu Subdivision water system improvements have not been completed and turned over to Department of Water Supply. Therefore, water service is not currently available.

The project is located on the Makawao Aquifer. The 12-inch waterline that will ultimately serve the site has not yet been completed and accepted by DWS. DWS standard commercial property consumption is 20,400gpd for 3.4 acres or 7,700gpd for 55,000 sq. ft. The Final Environmental Assessment should identify source, transmission and anticipated consumption for current and cumulative phases of the project.

Should the applicant be utilizing Kulamalu Inc. storage, transmission, or source credits the Board of Water Supply will need to be notified. Kulamalu Inc. will need to submit a letter (schedule "G" of the "Agreement Concerning the Construction of Storage Tank, Transmission Line and Appurtenances, and Development of Well" dated March 21, 1996) notifying Board of Water Supply of their intent to exercise a portion of the storage, transmission, and source credits allocated under the agreement. If credits have been exhausted, the applicant shall be required to pay the water system development fees and be placed on the Upcountry meter priority list in order to receive water service. The applicant is encouraged to contact our engineering division at 270-7835 to discuss the matter further.

The applicant will be required to comply with Water Department Rules and Regulations as well as provide for adequate fire protection, domestic source and backflow prevention in accordance to system standards. We recommend the applicant coordinate with our engineering division regarding system

improvements. To determine actual domestic, commercial and irrigation demand, calculations need to be made and stamped by a certified engineer. The approved fire flow calculation methods for the applicant's use include "Fire Flow -Hawaii Insurance Bureau, 1991 and Guide for Determination of Required Fire Flow" - Insurance Services Office, 1974.

The project is located within a Wellhead Protection Area (WHPA), as delineated by preliminary modeling efforts for a wellhead protection program. This indicates that water from the project site could affect drinking water supply wells within a 10-year time of travel for Haiku and Paia. DWS encourages the applicant to utilize Best Management Practices (BMP's) designed to minimize infiltration and runoff from all construction and vehicle operations.

State Department of Health Source Water Assessment Program Plan (SWAP) gives Research Labs a "High Contamination Potential" rating. A Few of the Chemicals listed for research labs in this review include: Barium, Benzene, Beryllium, Dichloromethane or Methylene Chloride, Endrin, Lead, Mercury, Selenium, Sulfuric Acid. We have provided Best Management Practices for managing chemicals that the research laboratory may use to carry out its function. The Final Environmental Assessment should outline which hazardous and toxic chemicals that will be used and how these substances will be handled while in use and disposed of after use. Additional information on BMP's for this type of activity is available through the State Department of Health.

The project is located in the Maui County Planting Plan - Plant Zone 2 and 4. In the event of future landscape renovations, we encourage the applicant to utilize appropriate native and non-invasive species and avoid the use of potentially invasive plants. Native plants adapted to the area, conserve water and further protect the watershed from degradation due to invasive alien species. Attached is a list of appropriate plants for the zones as well as potentially invasive plants to avoid.

We ask the applicant to consider conservation measures in and around the property. Some of these measures are listed for your use.

Utilize Low-Flow Fixtures and Devices: Maui County Code Subsection 16.20 A.680 requires the use of lowflow water fixtures and devices in faucets, Showerheads, Urinals, water closets and hose bibs. Water conserving washing machines, icemakers, and other units are also available.

Maintain Fixtures to Prevent Leaks: A simple, regular program of repair and maintenance can prevent the loss of hundreds or even thousands of gallons a day. Refer to the attached handout; "The Costly Drip" The applicant should establish a regular maintenance program.

Please feel free to contact our Water Resources and Planning Division at 270-7199, should you have any other questions.

Sincerely,

David Craddick

Director

mni CC:

Planning Department Engineering Division Applicant, w/ attachments

"The Costly Drip"

Ordinance 2108 B "An ordinance amending Chapter 16.20 of the Maui County Code, pertaining to the Plumbing Code"

Zone - Specific Native and Polynesian Plants: Zone 2 and 4

Best Management Practices - EPA's Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters - Construction Activities

BMPs for Managing Small Quantity Chemical Use to Prevent Contamination of Drinking Water. "A Checklist for Water Conservation Ideas for Commercial Buildings"



April 10, 2003

George Tengan, Director **Department of Water Supply** County of Maui 200 High Street Wailuku, Hawaii 96793

SUBJECT: Proposed Advanced Technology Center and Advanced Technology

Research Center; TMK 2-3-08: 38 and 39 (por.)

Dear Mr. Tengan:

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On behalf of the applicant, the University of Hawaii, Institute for Astronomy, we would like to note the following in response to your department's August 26, 2002 early consultation comments on the proposed project.

Information on water source, transmission, and projected use will be included in the project's Draft Environmental Assessment (EA). The applicant will also inform the Board of Water Supply should Kulamalu Inc. storage, transmission, or source credits be utilized for the project.

Water system improvements will be coordinated with the department's Engineering Division and Best Management Practices (BMPs) will be implemented during construction to minimize infiltration and runoff from construction-related activities. Should hazardous or toxic chemicals, such as those identifed in your letter be utilized in the facility's research labs, those substances will be identified in the Draft EA and appropriate BMPs for the management of these chemicals will be utilized. The water conservation measures reflected in your letter will be considered for the project.

305 High Street, Suite 104 Wailuku, Hawaii 96793 ph: (808)244-2015 fax: (808)244-8729 planning@mhinconline.com

George Tengan, Director April 10, 2003 Page 2

Please feel free to call me should you have any questions.

Very truly yours,

Glenn Tadaki, Planner

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GT:yp

cc: Michael Maberry, University of Hawaii, Institute for Astronomy
Don Fujimoto, Kulamalu Science, LLC

BENJAMIN J. CAYETANO GOVERNOR OF HAWAII



BRUCE S. ANDERSON, Ph.D., M.P.H. DIRECTOR OF HEALTH

STATE OF HAWAII

DEPARTMENT OF HEALTH P.O. BOX 3378 HONOLULU, HAWAII 96801 In reply, please refer to: File:

02-197/epo

August 27, 2002

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Mr. Glenn Tadaki, Planner Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Tadaki:

Subject:

Pre-Environmental Assessment (PEA) Consultation

University of Hawaii Advanced Technology Research Center

Kula, Maui, Hawaii State Dept. of Health Tax Map Key: 2-3-008:038 and 039 (por.)

Thank you for the opportunity to review and comment on the subject proposal. The PEA request was routed to the various branches of the Environmental Health Administration. We have the following comments.

Clean Water Branch (CWB)

- 1. The applicant should contact the Army Corps of Engineers to identify whether a federal permit (including a Department of Army permit) is required for this project. A Section 401 Water Quality Certification is required for "Any applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters...", pursuant to Section 401(a)(1) of the Federal Water Pollution Act (commonly known as the "Clean Water Act");
- 2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following discharges to waters of the State:
 - a. Discharge of storm water runoff associated with industrial activities, as define in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi);

Mr. Glenn Tadaki, Planner August 27, 2002 Page 2

- b. Discharge of storm water runoff associated with construction activities that involve the disturbance of five (5) acres or greater, including clearing, grading, and excavation;
- c. Discharge of treated effluent from leaking underground storage tank remedial activities;
- d. Discharge of once through cooling water less than one million gallons per day;
- e. Discharge of hydro-testing water;
- f. Discharge of construction dewatering effluent;
- g. Discharge of treated effluent from petroleum bulk stations and terminals; and
- h. Discharge of treated effluent from well drilling activities.

Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department of Health, Clean Water Branch (CWB) at least thirty (30) days prior to commencement of any discharges to State waters;

- 3. If construction activities involve the disturbance of one acre or greater, including clearing, grading, and excavation, and will take place or extend after March 10, 2003, an NPDES general permit coverage is required for discharges of storm water runoff into State waters; and
- 4. The applicant may be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters.

If you have any questions, please contact the Clean Water Branch at (808) 586-4309.

Wastewater Branch (WWB)

Wastewater generation, treatment and disposal have not been addressed in the submitted document. Previous correspondence indicated that the project was considering connecting to the private wastewater facility in the Pukalani Terrace development. Use of on-site individual wastewater systems is not acceptable for this development. A treatment works would be required.

Mr. Glenn Tadaki, Planner August 27, 2002 Page 3

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All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems". We reserve the right to review the detailed wastewater plans for conformance to applicable rules.

If you have any questions, please contact the Planning/Design Section of the Wastewater Branch at (808) 586-4294.

Clean Air Branch (CAB)

Control of Fugitive Dust

There is a significant potential for fugitive dust emissions during the removal, transport and installation activities for this project. Project activities will be, at times, conducted within the vicinity of neighboring residential dwellings, major thoroughfares and a school. It is recommended that a dust control management plan be developed which identifies and addresses all activities that have a potential to generate fugitive dust. Implementation of adequate dust control measures during all phases of development and construction activities is warranted.

Construction activities must comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust.

The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to:

- a. Planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;
- b. Providing an adequate water source at the site prior to start up of construction activities;
- c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;
- d. Controlling of dust from shoulders and access roads;
- e. Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and
- f. Controlling of dust from debris being hauled away from project site.

If you have any questions regarding these issues on fugitive dust, please contact the Clean Air Branch at (808) 586-4200.

Mr. Glenn Tadaki, Planner August 27, 2002 Page 4

Noise, Radiation and Indoor Air Quality (NRIAQ) Branch

All project activities shall comply with the Administrative Rules of the Department of Health, Chapter 11-46, on "Community Noise Control".

If you have any questions, please contact the NRIAQ at (808) 586-4701.

Sincerely,

Deputy Director

Environmental Health Administration

c: CWB WWB CAB NRIAQ Maui DHO



April 10, 2003

Chiyome L. Fukino, M.D., Director for Environmental Health

Department of Health

State of Hawaii

P.O. Box 3378

Honolulu, Hawaii 96801

SUBJECT: Proposed Advanced Technology Center and Advanced Technology

Research Center; TMK 2-3-08: 38 and 39 (por.)

Dear Ms. Fukino:

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On behalf of the applicant, the University of Hawaii, Institute for Astronomy, we would like to note the following in response to your department's August 26, 2002 early consultation comments on the proposed project.

The U.S. Army Corps of Engineers has also been consulted in connection with the project's early consultation process. In addition, construction activities will comply with applicable Department of Health requirements regarding NPDES general permit coverage, air pollution control, and community noise control. Wastewater disposal and treatment will be accommodated by the privately-operated Pukalani Terrace wastewater treatment facility.

Thank you again for providing us with your comments. Please feel free to call me should you have any questions.

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Glenn Tadaki, Planner

GT:yp

cc: Michael Maberry, University of Hawaii, Institute for Astronomy
Don Fujimoto, Kulamalu Science, LLC

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305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com.



SEP / 0 4 2002

GLBERT B. COLOMA-AGARAN, CHARPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEMENT

DEPUTIES ERIC T. HIRANO LINNEL NISHIOKA

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE
MANAGEMENT
CONSERVATION AND RESOURCES

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ENFORCEMENT CONVEYANCES FORESTRY AND WILDLIFE HISTORIC PRESERVATION

LAND STATE PARKS

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION KAKUHIHEWA BUILDING, ROOM 555 601 KAMOKILA BOULEVARD KAPOLEI, HAWAII 96707

August 27, 2002

Mr. Glen Tadaki Munckiyo & Hiraga, Inc. 305 South High Street, Suite 104 Wailuku, Hawaii 96793

LOG NO: 30606 < DOC NO: 0208CD50

Dear Mr. Tadaki,

SUBJECT:

Chapter 6E-8 Historic Preservation Review Pertaining to an Information Request for the Proposed Advanced Technology Center and Advanced

Technology Research Center

'A'apuco Ahupua'a, Makawao District, Island of Maui

TMK: (2) 2-3-008:038 and 039 por.

Thank you for the opportunity to review and comment on the information request pertaining to the proposed Advanced Technology Center and Advanced Technology Research Center, which was received by our staff July 26, 2002.

Based on the submitted information request, we understand the proposed undertaking consists of the proposed development of an Advanced Technology Center and Advanced Technology Research Center on a 3.4-acre site within the Kulamalu Commercial Subdivision in Kula.

Our records indicate that an acceptable archaeological inventory survey has been conducted of the subject properties during which three petroglyph sites had been identified and requested a preservation plan for these sites to be submitted to this office for review (SHPD DOC NO: 9912CD18/LOG NO.: 24653, SHPD DOC NO.: 9712BD36). We have previously reviewed and accepted the preservation plan pertaining to sites 50-50-10-4179 and 50-50-10-1061 (SHPD DOC NO.: 9909RC06/LOG NO.: 24075). We recently reviewed and accepted the preservation plan for site 50-50-10-1062 (SHPD DOC NO.: 0101MK08/LOG NO.: 26839). As preservation plans have been accepted and are in place, we believe the proposed undertaking will have "no adverse effect" on significant historic sites provided the conditions stipulated in these preservation plans are followed.

Please call Cathleen Dagher at 692-8023 if you have any questions.

Aloha,

-Don Hibbard, Administrator

State Historic Preservation Division

CD:jen

JAMES "KIMO" APANA Mayor JOHN E. MIN

Director

CLAYTON i. YOSHIDA Deputy Director

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COUNTY OF MAUI DEPARTMENT OF PLANNING

October 14, 2002

Mr. Glenn Tadaki Munekiyo & Hiraga Inc. 305 High Street, Suite 104 Wailuku, Maui, Hawaii 96793

Dear Mr. Tadaki:

RE: Early Consultation for Draft Environmental Assessment (EA) for the Proposed Advanced Technology Center and Advanced Technology Research Center at Kulamalu, TMK 2-3-008: 38 and 39 (por.)

The Planning Department (Department) has reviewed the summary for the proposed project. In December, 2000, design guidelines were approved for Kulamalu Village. The design of the project should be in keeping with the approved design guidelines.

The Department will most likely have additional comments as part of our review of the complete draft EA document.

Thank you for your cooperation in this matter. If further clarification is required, please contact Ms. Ann T. Cua, Staff Planner, of this office at 270-7735.

Very truly yours,

glasse Municipality

JOHN-E. MIN Planning Director

JEM:ATC:tlm

Clayton Yoshida, AICP, Deputy Planning Director Kulamalu TMK file Ann T. Cua, Staff Planner Project File General File

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250 SOUTH HIGH STREET, WAILUKU, MAUI, HAWAII 96793 PLANNING DIVISION (808) 270-7735; ZONING DIVISION (808) 270-7253; FACSIMILE (808) 270-7634

Quality Seamless Service - Now and for the Future



April 10, 2003

Michael W. Foley, Director **Department of Planning** County of Maui 250 South High Street Wailuku, Hawaii 96793

> Proposed Advanced Technology Center and Advanced Technology SUBJECT:

Research Center; TMK 2-3-08: 38 and 39 (por.)

Dear Mr. Foley:

On behalf of the applicant, the University of Hawaii, Institute for Astronomy, and in response to your department's October 14, 2002 early consultation comments on the proposed project, we would like to note that the project will be developed in accordance with the design standards for Kulamalu Village.

Thank you again for providing us with your comments. Please feel free to call me should you have any questions.

Very truly yours,

Glenn Tadaki, Planner

GT:yp

Mike Maberry, University of Hawaii, Institute for Astronomy Don Fujimoto, Kulamalu Science, LLC

DION FILI 9.
305 High Street, Suite 104- Wailuku, Hawaii 96793- ph: (808)244-2015- fax: (808)244-8729- planning@mhinconline.com.

Chapter XI

Letters Received During the Draft Environmental Assessment Public Comment Period and Responses to Substantive Comments

XI. LETTERS RECEIVED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT PUBLIC COMMENT PERIOD AND RESPONSES TO SUBSTANTIVE COMMENTS

The Draft Environmental Assessment (EA) for the proposed project was published in the March 23, 2004 edition of the Environmental Notice. Copies of the Draft EA were provided to agencies, organizations, and individuals for review and comment. The 30-day public comment period for the Draft EA expired on April 22, 2004. Letters received during the Draft EA public comment period, as well as responses to substantive comments, are included in this section. In addition, a meeting with the Kula Community Association's Board of Directors was held on May 11, 2004. A summary of this meeting is included at the end of this section as well.

MAR 26 2004



ALAN M. ARAKAWA Mayor

ALICE L. LEE

HERMAN T. ANDAYA Deputy Director

86 W. KAMEHAMEHA AVENUE • KAHULUI, HAWAII 96732-2259 • PHONE (808) 270-7351 • FAX (808) 270-6284

March 23, 2004

Mr. Michael Munekiyo, A.I.C.P. Project Manager Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: PROPOSED ADVANCED TECHNOLOGY CENTER AND ADVANCED TECHNOLOGY RESEARCH CENTER, TMK 2-3-08:38 AND 39 (POR.)

We have reviewed the Draft Environmental Assessment (dated March 2004) for the subject project and have no comment to offer.

Thank you for the opportunity to comment. We are returning the draft EA for your use.

tory charly yours

ALICE L. LEE Director

ETO:hs

Enclosure

c: Housing Administrator

United States Department of Agriculture





Our People...Our Islands...In Harmony 210 lmi Kala Street, Suite #209, Wailuku, HI 96793-2100

Date: March 24, 2004

Mr. Glenn Tadaki, Planner Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Tadaki,

SUBJECT: Proposed Advanced Technology Center and Advanced Technology Research Center TMK: 2-3-008: 038 and 039 (por)

We have reviewed the subject Draft Environmental Assessment and have no comment to offer.

Thank you for the opportunity to review this document.

Sincerely,

Neal S. Fujiwara

District Conservationist

FAX (808) 594-1865

PHONE (808) 594-1888



STATE OF HAWAI'I OFFICE OF HAWAIIAN AFFAIRS 711 KAPI'OLANI BOULEVARD, SUITE 500 HONOLULU, HAWAI'I 96813

HRD04-690B

March 31, 2004

Glenn Tadaki, Planner Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, HI 96793

Subject: Draft Environmental Assessment for the Proposed Advanced Technology Research Center, TMK: (2) 2-3-08:38 and 39 (portion)

Dear Mr. Tadaki:

Thank for your letter dated March 19, 2004 regarding the Draft Environmental Assessment (DEA) for the Proposed Advanced Technology Center and Advanced Technology Research Center for the Institute for Astronomy (IFA) at the University of Hawaii located on a 3.4 acre site at Kula, Maui, Hawaii, TMK: (2)-2-3-08:38 and 39 (portion). Your letter requests that the Office of Hawaiian Affairs (OHA) review and comment on the proposed project.

The DEA notes that archeological surveys that were conducted for the Kulamalu project area did not locate any archeological sites or cultural artifacts on the project site. Additionally, consultations with Native Hawaiian cultural practitioners like Charles Kauluwehi Maxwell Sr. by CKM Cultural Resources¹ didn't reveal "any cultural practices, gathering or subsistence practices occurring on land within the project area."

The DEA indicates the project site "was formerly utilized as pasture and has recently been disturbed in connection with the mass grading for the Kulamula Town Center Subdivision." Photographs of the project area reveal that extensive grading and grubbing has already occurred on the site.

The IFA has an annual budget of \$20 million, and receives \$15 million in federal grants, which in many circumstances would trigger the 106

¹ CRM Cultural Resources were hired by the project consultants to prepare the Cultural Impact Assessment contained in Appendix D of the DEA.

Consultation Process of the National Historic Preservation Act. Given the extensive grading and grubbing that has already occurred on the site, without revealing any significant archaeological remains, it doesn't appear necessary to trigger this process. However, as the DEA indicates, if any significant cultural deposits or human burials are encountered on the site², work will cease in this area and the State Historic Preservation Division will be contacted.

If you have questions or concerns please contact Matthew Myers, Policy Advocate at 594-1945 or matthewm@oha.org.

'O wau iho nö,

Clyde W. Nämu'o Administrator

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² OHA staff notes that any trenching, digging or grading for four structures the ATC Building (Phase 1), Future Annex (Phase 2), Future Lecture Building (Phase 2) and the Future ATRC Building (Phase 2) may reveal cultural deposits or human remains.

APR 0 6 2004

ALAN M. ARAKAWA Mayor



GLENN T. CORREA Director

JOHN L. BUCK III Deputy Director

(808) 270-7230 Fax (808) 270-7934

DEPARTMENT OF PARKS & RECREATION

700 Hali'a Nakoa Street, Unit 2, Wailuku, Hawaii 96793

April 1, 2004

Glenn Tadaki, Planner Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Tadaki:

SUBJECT:

PROPOSED ADVANCED TECHNOLOGY CENTER AND ADVANCED

TECHNOLOGY RESEARCH CENTER

TMK 2-3-08:38 and 39 (por.)

We have reviewed the Draft Environmental Assessment for the subject project and have no comments concerning this project.

Thank you for the opportunity to review and comment. Should there be any questions, please contact Mr. Patrick Matsui, Chief of Parks Planning and Development, at 270-7387.

Sincerely,

GLENN T. CORREA

Director

c: Patrick Matsui, Chief of Planning and Development



DEPARTMENT OF THE ARMY U. S. ARMY ENGINEER DISTRICT, HONOLULU FT. SHAFTER, HAWAII 96858-5440

April 12, 2004

Regulatory Branch

Mr. Glenn Tadaki, Planner Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Tadaki:

This responds to your written request for review comments on the Draft Environmental Assessment (DEA) for proposed University of Hawaii Institute for Astronomy development of an Advanced Technology Center and Advanced Technology Research Center on a 3.4-acre site within the Kulamalu Commercial Subdivision in Kula, Maui (TMK 2-3-8: 38 and por. 39). We have reviewed the document with respect to the Corps' authority to issue Department of the Army (DA) permits under Section 10 of the River and Harbor Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344).

Based on the information provided in the DEA, it appears that there are no waters of the United States, including wetlands, on the project site; therefore, a DA permit is not required for this activity.

Should you have questions concerning this determination, please contact Mr. Peter Galloway of my staff at 808-438-8416 (fax 808-438-4060). Written inquiries should cite File No. 200200457 and should be sent to: Regulatory Branch (CEPOH-EC-R/P. Galloway); U.S. Army Engineer District, Honolulu; Building 230; Fort Shafter, Hawaii 96858-5440.

Sincerely,

George P. Young, P.E. Chief, Regulatory Branch

APR 1 3 2004

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ALAN M. ARAKAWA MAYOR



CARL M. KAUPALOLO CHIEF NEAL A. BAL DEPUTY CHIEF

COUNTY OF MAUI DEPARTMENT OF FIRE AND PUBLIC SAFETY

200 DAIRY ROAD KAHULUI, MAUI, HAWAII 96732 (808) 270-7561 FAX (808) 270-7919

April 13, 2004

Munekiyo & Hiraga, Inc. Michael T. Munekiyo, Project Manager 350 High Street, Suite 104 Wailuku, HI 96793

Subject: Advanced Technology Center, Kula, Hawaii TMK 2-3-008:038,039

Dear Mr. Munekiyo,

I have reviewed your request to comment on the subject property. At this time, I have no additional remarks. A complete construction review will be done during the permit process

Thank you for allowing me the opportunity to comment on this subject. Please feel free to contact me if you have any questions at 270-7568.

Sincerely,

Valeriano F. Martin

Captain

Fire Prevention Bureau

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ALAN M. ARAKAWA MAYOR

OUR REFERENCE tj YOUR REFERENCE

POLICE DEPARTMENT ./

COUNTY OF MAUL

55 MAHALANI STREET WAILUKU, HAWAII 96793 (808) 244-6400 FAX (808) 244-6411 APR 2 3 2004

THOMAS M. PHILLIPS CHIEF OF POLICE

KEKUHAUPIO R. AKANA DEPUTY CHIEF OF POLICE

April 19, 2004

Mr. Michael Munekiyo, A.I.C.P. Project Manager Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, HI 96793

Dear Mr. Munekiyo:

SUBJECT: Proposed Advanced Technology Center and Advanced Technology Research Center, TMK 2-3-08:38 and 39 (por.)

Thank you for your letter of March 19, 2004, requesting comments on the above subject.

We have reviewed the proposed summary and have enclosed our comments and recommendations. As always, thank you for giving us the opportunity to comment on this project.

Very truly yours,

Assistant Chief Sydney Kikuchi for: Thomas M. Phillips

Chief of Police

Enclosure

c: Michael W. Foley, Dept. of Planning

THOMAS PHILLIPS, CHIEF, MAUI POLICE DEPARTMENT HUNCKY & TO

VIA

RANDALL BURGESS, P.O.III, COMMUNITY POLICING FROM

SUBJECT PROPOSED ADVANCED TECHNOLOGY CENTER AND ADVANCED TECHNOLOGY

RESEARCH CENTER

Sir, this To/From is being submitted in regards to police comments/recommendations to the proposed Advanced Technology Center and Advanced Technology Research Center located in the Kulamalu Town Center Subdivision (TMK 2-3-08:38 and 39).

Project review reveals the following comments:

In regards to roadways/traffic; the Kula Highway/A'apueo Parkway intersection is currently unsignalized. A project of this size will surely affect traffic at this intersection, especially during after-work/after-school hours. The traffic study enclosed within the Draft Environmental Assessment (EA) recommends the installation of a traffic signal at this intersection by the year 2005 and without project generated traffic. My knowledge of the community reveals that the vast majority of area residents do not desire a traffic signal at this intersection.

In regards to the proposed project in general; again, my knowledge of the community reveals that the vast majority of Upcountry residents strongly desire to preserve and save the Upcountry character/ambiance. The Upcountry area is comprised mostly of residential homes, small farms, pineapple cultivation, cattle ranching, and is known world-wide for it's rural/open pasture-land settings. Therefore, I suggest that the County of Maui centralize Research Center projects in non-rural areas. I further suggest that the area of the Maui High Performance Computing Center located at 550 Lipoa Parkway, Kihei, be considered as a possible project site.

In closing, I strongly suggest that this proposed project be presented to Upcountry residents via a community meeting for their review and comment.

espectfully submitted, Comments by Officer BURGESS in regards to the Randall BURGESS #1023 entrance of the proposed project on A'apueo Parkway 041504 @ 1500 hours and the need for a traffic signal. It's known that Kamehameha Schools is expanding their campus which would mean more vehicle traffic entering/exiting A'apueo Parkway From/onto Kula Highway. A'apueo Parkway is also approximately 150 yards from the entrance to King Kekaulike High School. A Community meeting regarding this project as well as the installation of a traffic signal, as suggested by Officer BURGESS is needed for the public's input. Though the traffic signal may assist vehicles exiting from A'apueo Parkway, it could also cause a back-up of traffic on Kula Hwy. at the "Old" Haleakala Hwy./By-pass intersection, for traffic heading South (Ulupalakua direction).

> I DO NOT BELIEVE THIS prosect is to coop fit for prosect is to coop fit for



May 14, 2004

Thomas Phillips, Chief Maui Police Department 55 Mahalani Street Wailuku, Hawaii 96793

SUBJECT: Proposed Advanced Technology Center and Advanced Technology

Research Center: TMK 2-3-08: 38 and 39 (por.)

Dear Mr. Phillips:

Thank you for your April 19, 2004 letter commenting on the subject's Draft Environmental Assessment (EA). On behalf of the applicant, the University of Hawaii, Institute for Astronomy (IFA), we would like to note the following.

1. As indicated by the IFA project's traffic engineer, the Draft Traffic Impact Analysis for the Kamehameha Schools Maui Campus, prepared by Phillip Rowell and Associates, (dated June 20, 2002) indicated that a traffic signal system is warranted at the Kula Highway/A`apueo Parkway intersection during the existing PM peak hour of traffic. A traffic signal would still be warranted even without the expansion of the Kamehameha Schools Maui Campus or any other proposed developments within the Kulamalu area.

Since the traffic signal is warranted under the Kamehameha Schools expansion traffic study, the Traffic Impact Analysis Report (TIAR) for the IFA project assumed that the traffic signal system at the Kula Highway/A`apueo Parkway intersection would be installed prior to completion of the IFA project. It is our understanding that a traffic signal system at the Kula Highway/A`apueo Parkway intersection is currently being designed, and will be constructed once all regulatory approvals have been obtained.

The proposed traffic signal system at Kula Highway/A`apueo Parkway should be interconnected with the traffic signal system at the Kula Highway/Haleakala Highway/Old Haleakala Highway intersection so that the two intersections can be coordinated with one another.

2. The proposed project is consistent with, and a continuation of, the IFA's historic use and presence in the Kula region. The proposed project site is designated for

planning environment

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconling.com V e r m rn e m t.

Thomas Phillips, Chief May 14, 2004 Page 2

> Business/Commercial uses by the Makawao-Pukalani-Kula Community Plan land use map and for Country Town Business District uses by Maui County zoning (buildings and premises used by government agencies are a permitted use within this zoning district). The existing IFA laboratory in the Waiakoa area of Kula has been in operation since the mid-1960s and serves as a support/base station for work at the observatories on the summit of Haleakala. The proposed and existing IFA facilities are roughly equidistant to the observatories at the summit. IFA researchers check in at the Waiakoa laboratory to perform administrative tasks before and after traveling to the observatories atop Haleakala. Round trip travel between the Waiakoa laboratory and the summit takes about 1 hour and 30 minutes, while round trip travel between the Maui High Performance Computing Center in Kihei takes approximately 4 hours. The incremental difference in round trip travel between Kihei and the summit (2 hours and 30 minutes) results in irretrievable impacts to IFA operations in terms of lost time, productivity, and labor costs. In light of the foregoing, the proposed project site is deemed optimal in terms of an appropriate location for the IFA's operations and is consistent with the community plan and zoning designations for the site.

3. A meeting with Kula Community Association Board of Directors was held on May 11th, to discuss the proposed project. At this meeting, there were no comments or concerns regarding the installation of the traffic signal at the Kula Highway/A`apueo Parkway intersection.

Thank you again for providing us with your comments. Please feel free to call me should you have any questions.

Very truly yours,

Glenn Tadaki, Planner

GT:yp

cc: Jan Yokota, University of Hawaii
Don Fujimoto, Kulamalu Science, LLC

Keith Niiya, Austin Tsutsumi & Associates

dowling\astronmy\mpd.deares

LINDA LINGLE GOVERNOR OF HAWAII



GEHEVIEVE SALMONSON DIRECTOR

OFFICE OF ENVIRONMENTAL QUALITY CONTROL

235 SOUTH BERETANA STREET SUITE 702 HONOLULU, HAWAII 96813 TELEPHONE (008) 586-4185 FACSIMILE (808) 588-4180 E-mail: 0000 Shaakin state hilus

April 21, 2004

Jan Yokota University of Hawaii 1951 East-West Road Honolulu, Hawaii 96822

Dear Ms. Yokota:

Subject:

Draft environmental assessment (EA) for Advanced Technology Center &

Advanced Technology Research Center, Kulamalu, Maui

We have the following comments to offer:

Community meeting: A community informational meeting was mentioned in the response to the pre-consultation letter from Elliott Krash of the Kula Community Association. In the final EA give the date of its occurrence and a synopsis of the issues raised.

Sustainable building techniques: Please consider applying sustainable building techniques presented in the "Guidelines for Sustainable Building Design in Hawaii." In the final EA include a description of any of the techniques you will implement. Go to our website at http://www.state.hi.us/health/oeqc/guidance/sustainable.htm or contact our office for a paper copy of the guidelines.

If you have any questions, call Nancy Heinrich at 586-4185.

Sincercly,

GENEVIEVE SALMONSON

Director

c: Glenn Tadaki



June 16, 2004

Genevieve Salmonson, Director Office of Environmental Quality Control 235 South Beretania Street, Suite 702 Honolulu, Hawaii 96813

SUBJECT: Proposed Advanced Technology Center and Advanced Technology

Research Center; TMK 2-3-08: 38 and 39 (por.)

Dear Ms. Salmonson:

Thank you for your April 21, 2004 letter commenting on the subject's Draft Environmental Assessment (EA). On behalf of the applicant, the University of Hawaii, Institute for Astronomy, we would like to note the following.

A meeting with the Kula Community Association's Board of Directors was held on May 11th to discuss the proposed project. A summary of this meeting will be included in the Final EA. Insofar as building design is concerned, appropriate measures from the "Guidelines for Sustainable Building Design in Hawaii" will be included in the Final EA.

Thank you again for providing us with your comments. Please feel free to call me should you have any questions.

Very truly yours,

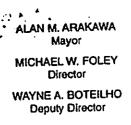
Glenn Tadaki, Planner

GT:yp

cc: Jan Yokota, University of Hawaii
Don Fujimoto, Kulamalu Science, LLC

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305 High Street, Suite 104 · Wailuku, Huwaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com





April 21, 2004

Mr. Glenn Tadaki Munekiyo & Hiraga 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Tadaki:

RE: Review of the Draft Environmental Assessment Prepared for the Proposed Advanced Technology Center and Advanced Technology Research Center located at TMK: 2-3-008: 038 and 039 (portion), Kulamalu Town Center, Kula, Island of Maui, Hawaii (LTR 2004/1035)

The Maui Planning Department (Department) has reviewed the Draft Environmental Assessment (DEA) prepared in accordance with Chapter 343, HRS, and Title 11, Chapter 200, HAR, and offers the following comments:

- 1. Discuss the water and wastewater allocation for the proposed use as it relates to the pre-determined, anticipated capacities for the entire subdivision.
- 2. Although unknown at the present time, the report states that maintenance and operations activities may require the use of hazardous substances of which will be managed and disposed of in accordance with the Resource Conservation and Recovery Act (RCRA). Consumer sized quantities of such substances may be permissible for building maintenance activities. Unless related to educational uses, please be advised that bulk quantities of such substances associated with proposed uses (e.g., manufacturing/fabrication of parts) would not be permissible in the zoning district. The Department further notes that chemical testing laboratories are not permitted within the zoning district unless limited to educational purposes only.

In review our records for the Kulamalu Town Center's CC&R's and Design Guidelines, the Department notes that the use, storage,

Mr. Glenn Tadaki April 21, 2004 Page 2

generation, or disposal of hazardous materials are not permitted within the subdivision, except when associated with an automobile service station or other materials routinely sold at retail in stores.

- 3. The project design should incorporate low level lighting on the building and within the landscaped areas. Further, the parking lot lighting should be fully shielded.
- 4. Discuss proposed energy conservation measures utilized in the project design.
- 5. Identify the federal, state, and/or county funding sources for the proposed project and for continued operation of the facility.
- `6. Label "Ohi'a Ku Roadway" on the Site Plan in Appendix A.
- 7. Page 7 of the report indicates the scope of the DEA is for both Phase 1 and 2 of the project. As such, Appendix A should include the exterior elevations and floor plans for both buildings proposed in Phase 2.

Thank you for your cooperation. Should you require additional darification, please contact Ms. Kivette A. Caigoy, Environmental Planner, of my office at 270-7735.

Sincerely.

MICHAEL W. FOLEY Planning Director

14

MWF:KAC:lar

c: Wayne Boteilho, Deputy Planning Director
Clayton Yoshida, Planning Program Administrator
Kivette A. Caigoy, Environmental Planner
OEQC
General File
K:WP_DOCS/PLANNING/EA/DEAComments/2004/1035_ATC_KulamaluSubd.wpd



May 14, 2004

Michael W. Foley, Director Department of Planning County of Maui 250 South High Street Wailuku, Hawaii 96793

SUBJECT: Proposed Advanced Technology Center and Advanced Technology

Research Center; TMK 2-3-08: 38 and 39 (por.)

Dear Mr. Foley:

V

Thank you for your April 21, 2004 letter commenting on the subject's Draft Environmental Assessment (EA). On behalf of the applicant, the University of Hawaii, Institute for Astronomy (IFA), we would like to note the following.

- 1. The applicant has a source allocation of approximately 738,000 gallons per day (gpd) for its contribution to the development of a new well in Kaupakalua to supplement the County's surface source for the Makawao-Pukalani water system. A portion of this allocation will be utilized by the IFA to accommodate the project's estimated average daily demand of 6,200 gpd at full build-out. The applicant also has a capacity allocation of approximately 75,000 gpd at the Pukalani Terrace sewage treatment plant, a privately operated facility. A portion of this allocation will be used by the IFA to accommodate the estimated 5,500 gpd of wastewater generated by the project at full build-out.
- 2. As indicated by the IFA, no significant amounts of hazardous substances will be stored and utilized at the proposed facility. Small amounts of cutting oil (for machining precision instruments) and optical grade alcohol (for optics cleaning) will be utilized for facility operations, while consumer-sized quantities of cleaning materials will be used for routine facility maintenance. No vehicle servicing and maintenance activities will occur at the project site as these activities will be handled at the IFA's existing Waiakoa facility. The proposed facility is for research and educational work and does not include a chemical testing laboratory as a component. The proposed project is consistent with the Makawao-Pukalani-Kula Community Plan (Business/Commercial) and Maui Country zoning (Country Town Business District) designations for the site.

environment planning planning@mhinconline.com vernmen

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)241-2015 · fax: (808)241-8729 · planning@mhinconline.com v e r n r e n

Michael W. Foley, Director May 14, 2004 Page 2

It is noted that Country Town Business District zoning allows buildings and premises used by government agencies as a permitted use.

The use, handling, and disposal of hazardous materials will be conducted in accordance with the University of Hawaii's Environmental Health and Safety Office standards. The proposed project is not contrary to the CC&Rs and Design Guidelines for the Kulamalu Town Center as the intent of these provisions is to restrict facilities which routinely utilize large quantities of hazardous materials in connection with their operational and maintenance activities. The CC&Rs and Design Guidelines will be reviewed, and revised as necessary, to clarify the intent of the provisions regarding hazardous materials.

- 3. Parking lot light poles will be fully shielded and appropriate low-level lighting fixtures will be utilized for the project's buildings and landscaping.
- 4. Energy efficient measures considered for the project include the use of energy efficient windows, water heaters, and light fixtures, as well as automated light sensors and temperature controls, fiberglass insulation in the building's walls and ceilings, and the use of weatherstripping and low-flow plumbing fixtures.
- Funds appropriated by the State legislature will be used for the construction of the project. The use of the proposed facility will be funded through monies from the University of Hawaii's operating budget.
- 6. The site plan in Appendix A will be revised to identify Ohi`a Ku Street.
- 7. The preparation of floor plans and building elevations for Phase II is contingent upon State funding for the acquisition of Lot 17. Notwithstanding this, the Draft EA evaluated the project based upon the full build-out of Phases I and II.

Michael W. Foley, Director May 14, 2004 Page 3

Thank you again for providing us with your comments. Please feel free to call me should you have any questions.

Very truly yours,

Glenn Tadaki, Planner

cc: Jan Yokota, University of Hawaii
Don Fujimoto, Kulamalu Science, LLC

LINDA LINGLE GOVERNOR OF HAWAN



STATE OF HAWAII DEPARTMENT OF HEALTH P.O. Box 3378 HONOLULU, HAWAII 96801-3378

CHIYOME L. FUKINO, M.D.

In reply, please refer to: EPO-04-060

April 23, 2004

Mr. Michael Munekiyo Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT:

Proposed Advanced Technology Center and Advanced Technology Research center, TMK 2-3-008:38 and 39 (por.)

Thank you for allowing us to review and comment on the subject document. We have the following comments to offer. If you have any questions about these comments please contact Ryan Davenport at 586-4346.

Clean Water Branch Standard Comments

- 1. The Army Corps of Engineers should be contacted at (808) 438-9258 to identify whether a Federal license or permit (including a Department of Army permit) is required for this project. Pursuant to Section 401(a)(1) of the Federal Water Pollution Act (commonly known as the "Clean Water Act"), a Section 401 Water Quality Certification is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters...."
- A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following activities:
 - Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi).
 - Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NPDES permit is required before the commencement of the construction activities.

Mr. Michael Munekiyo April 23, 2004 Page 2

- c. Discharges of treated effluent from leaking underground storage tank remedial activities.
- d. Discharges of once through cooling water less than one (1) million gallons per day.
- e. Discharges of hydrotesting water.
- f. Discharges of construction dewatering effluent.
- g. Discharges of treated effluent from petroleum bulk stations and terminals.
- h. Discharges of treated effluent from well drilling activities.
- i. Discharges of treated effluent from recycled water distribution systems.
- j. Discharges of storm water from a small municipal separate storm sewer system.
- k. Discharges of circulation water from decorative ponds or tanks.

The CWB requires that a Notice of Intent (NOI) to be covered by a NPDES general permit for any of the above activities be submitted at least 30 days before the commencement of the respective activities. The NOI forms may be picked up at our office or downloaded from our website at http://www.state.hi.us/health/eh/cwb/forms/genl-index.html.

- 3. The applicant may be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters and/or coverage of the discharge(s) under the NPDES general permit(s) is not permissible (i.e. NPDES general permits do not cover discharges into Class 1 or Class AA receiving waters). An application for the NPDES permit is to be submitted at least 180 days before the commencement of the respective activities. The NPDES application forms may also be picked up at our office or downloaded from our website at http://www.state.hi.us/health/eh/cwb/forms/indiv-index.html.
- 4. Hawaii Administrative Rules, Section 11-55-38, also requires the owner to either submit a copy of the new NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the DOH that the project, activity, or site covered by the NOI or application has been or is being reviewed by SHPD. Please submit a copy of the request for review by SHPD or SHPD's determination letter for the project.

If you have any questions, please contact the CWB at 586-4309.

Wastewater Branch

We have reviewed the subject document which proposes the development of an Advanced Technology Center (ATC) and an Advanced Technology Research Center (ATC) on a 3.4 acre site at Kula, Maui, Hawaii.

We have the following comments to offer. The subject project is located in the Critical Wastewater Disposal Area (CWDA) as determined by the Maui County Wastewater Advisory Committee where no new cesspools will be allowed. As wastewater treatment and disposal will

Mr. Michael Munekiyo April 23, 2004 Page 3

be handled by connection to the Pukalani Wastewater Treatment Plant, we have no objections to the proposed project.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We do reserve the right to review the detailed wastewater plans for conformance to applicable rules. Should you have any questions, please contact the Planning & Design Section of the Wastewater Branch at telephone (808)586-4294.

Solid and Hazardous Waste Branch

1. The OSWM recommends the development of a solid waste management plan that encompasses all project phases including demolition, construction, and occupation of the buildings.

Specific examples of elements that the plan should address include:

- Recycling construction and demolition wastes, if appropriate;
- The use of locally produced compost in landscaping;
- The use of recycled content building materials;
- The provision of recycling facilities in the design of the project.

The developer shall ensure that all solid waste generated during project construction is directed to a Department of Health permitted solid waste disposal or recycling facility.

If there are any questions please contact the Solid and Hazardous Waste Branch at 586-4226.

Noise Radiation and Indoor Air Quality

"Project activities shall comply with the Administrative Rules of the Department of Health:

• Chapter 11-46 Community Noise Control.

Should there be any questions, please contact Russell S. Takata, Environmental Health Program Manager, Noise, Radiation and Indoor Air Quality Branch, at 586-4701."

5-1

Sincerely,

JUNE F. HARRIGAN-LUM, MANAGER

Environmental Planning Office

c: CWB NRAIQ WWB

SHWB



April 30, 2004

Programme of the second

June F. Harrigan-Lum, Manager Environmental Planning Office Department of Health P.O. Box 3378 Honolulu, Hawaii 96801-3378

SUBJECT: Proposed Advanced Technology Center and Advanced Technology

Research Center; TMK 2-3-08: 38 and 39 (por.)

Dear Ms. Harrigan-Lum:

Thank you for your April 23, 2004 letter commenting on the subject's Draft Environmental Assessment (EA). On behalf of the applicant, the University of Hawaii, Institute for Astronomy, we would like to note the following.

A copy of the Draft EA was provided to the U.S. Army Corps of Engineers for review and comment. Based on its review of the Draft EA, the Corps of Engineers indicated that a Department of the Army permit is not required for the proposed activity.

NPDES general permit coverage will be obtained prior to the start of construction. In addition to acknowledging the department's comments about solid waste disposal and management, the applicant will work with the contractor to ensure that the project is implemented in accordance with the applicable provisions of Chapter 11-62 (Wastewater Systems) and Chapter 11-46 (Community Noise Control).

June F. Harrigan-Lum, Manager April 30, 2004 Page 2

Thank you again for providing us with your comments and please feel free to call me should you have any questions.

Very truly yours,

Glenn Tadaki, Planner

GT:yp

cc: Jan Yokota, University of Hawaii
Don Fujimoto, Kulamalu Science, LLC

CHIYOME L. FUKINO, M. D. DIRECTOR OF HEALTH LORRIN W. PANG, M. D., M. P. H.

DISTRICT HEALTH OFFICER

LINDA LINGLE RNOR OF HAWAII

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STATE OF HAWAII DEPARTMENT OF HEALTH MAUI DISTRICT HEALTH OFFICE 54 HIGH STREET WAILUKU, MAUI, HAWAII 96793-2102

April 26, 2004

Mr. Glenn Tadaki Munekiyo & Hiraga, Inc. 305 South High Street, Suite 104 Wailuku, Hawai'i 96793

Dear Mr. Tadaki:

Subject:

Proposed Advanced Technology Center and Advanced

Technology Research Center TMK: (2) 2-3-08:38 and 39 (por.)

Thank you for the opportunity to comment on the Draft Environmental Assessment for the proposed technology center. The following comments are offered:

- 1. The noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules (HAR), Chapter 11-46 "Community Noise Control". A noise permit may be required and should be obtained before the commencement of work.
- 2. HAR, Chapter 11-46 sets maximum allowable sound levels from stationary equipment such as compressors and HVAC equipment. The attenuation of noise from these sources may depend on the location and placement of these types of equipment. This should be taken into consideration during the planning, design, and construction of the building and installation of these types of equipment.
 - 3. National Pollutant Discharge Elimination System (NPDES) permit coverage is required for this project. The Clean Water Branch should be contacted at 808 586-4309.
 - 4. Due to the nature and location of the project, there is a significant potential for fugitive dust emissions during site work preparations. It is recommended that a dust control management plan be developed. Implementation of adequate dust control measures during all phases of the project is warranted. Construction activities must comply with the provisions of HAR, Chapter 11-60.

Mr. Glenn Tadaki April 26, 2004 Page 2

5. The property may be harboring rodents that will be dispersed to the surrounding areas when the site is cleared. The applicant is required by Hawaii Administrative Rules, Chapter 11-26, "Vector Control" to eradicate any rodents prior to demolition or site clearing activities and to notify the Department of Health by submitting Form VC-12 to the Maui Vector Control program when such action is taken. Rodent traps and/or rodenticides should be set out on the project site for at least a week or until the rodent activity ceases. The Maui Vector Control program phone number is 873-3560.

Should you have any questions, please call me at 984-8230.

Sincerely,

Herbert S. Matsubayashi

District Environmental Health Program Chief



April 30, 2004

Herbert S. Matsubayashi, District Environmental Health Program Chief Department of Health State of Hawaii 54 High Street Wailuku, Hawaii 96793

SUBJECT: Proposed Advanced Technology Center and Advanced Technology

Research Center: TMK 2-3-08: 38 and 39 (por.)

Dear Mr. Matsubayashi:

Thank you for your April 26, 2004 letter commenting on the subject's Draft Environmental Assessment (EA). On behalf of the applicant, the University of Hawaii, Institute for Astronomy, we would like to note the following.

The construction of the project will be in accordance with the applicable provisions of Chapter 11-46 (Community Noise Control), Chapter 11-60 (Air Pollution Control), and Chapter 11-26 (Vector Control), as well as NPDES requirements for permit coverage.

Thank you again for providing us with your comments and please feel free to call me should you have any questions.

Very truly yours,

Glenn/Tadaki, Planner

GT:yp

cc: Jan Yokota, University of Hawaii

Don Fujimoto, Kulamalu Science, LLC

dowling\astronmy\dohmaul.deares

305 High Street, Suite 104 · Wailuku, Huwaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 planning@mhinconline.com

LINDA LINGLE



STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES **LAND DIVISION**

POST OFFICE BOX 621 HONOLULU, HAWAII 96809

April 28, 2004

PETER T. YOUNG CHARPERSON BOARD OF LAND AND NATURAL RESOURCES CORRESSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON DEPUTY DRECTOR - LAND

ERNEST Y.W. LAU DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONNEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND STATE PARKS

LD-NAV UHMAUITECHCTN.RCM

Munekiyo and Hiraga, Inc. Michael T. Munekiyo, A.I.C.P. Project Manager 305 High Street, Suite 104 Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

Draft Environmental Assessment for the Proposed Advance Technology Center and Advance Technology Research Center

TMK: (2) 2-3-008 and 009 (portion)

Thank you for the opportunity to review and comment on the subject matter.

The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of the subject Draft Environmental Assessment to the following DLNR Divisions for their review and comment:

- Division of Forestry and WildlifeDivision of State Parks
- Engineering Division
- Commission on Water Resource Management
- Office of Conservation and Coastal Lands
- Land-Maui District Land Office
- Land-Planning and Development
- Land-Project Development Specialist

Enclosed please find a copy of the Engineering Division comment.

Based on the attached responses, the Department of Land and Natural Resources has no other comment to offer.

If you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 1-808-587-0384.

Very truly yours,

DIERDRE S. MAMIYA Administrator

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BOARD OF LUID AND NATURAL RESOURCES
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DAN DAVIDSON DEPUTY DIRECTOR - LAND

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STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCESHO & LAND DIVISION

POST OFFICE BOX 621 STATE OF HAWAII HONOLULU, HAWAII 96809

AQUATIC RESOURCES BOATING AND OCEAN RECREATION BUREAU OF CONVEYANCES RAIDESOURCES COMMENTON AND RESOURCES ENFORCEMENT
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SEE ME

FAX/SEND COPY TO

April 2, 2004

LD/NAV Ref.: UHMAUI	TECHCTN.CMT Suspense Date:	L-1772 4/11/3/04 OMINISTRATOR
MEMORANDUM:		ASST ADMIN DEV RO AND PLACER
*XXX *XXX *XXX *XXX *XXX	Division of Aquatic Resources Division of Forestry & Wildlife Division of State Parks Na Ala Hele Trails Division of Boating and Ocean Recreation Commission on Water Resource Management Office of Conservation and Coastal Lands Engineering Division Land-Maui District Land Office (DD) Land-Planning and Development Land-Project Development Specialist	CIRC/POST/STAFF RM CIRC/POST/STAFF RM CIRC/POST/STAFF RM COMMENTS & REC DRAFT REPLY FILE FOLLOW UP INFO RUN COPIES RUSH DUE

FROM:

Dierdre S. Mamiya, Administrator

Land Division

SUBJECT: Proposed Advance Technology Center and Advance Technology

Research Center. TMK: (2) 2-3-008 and 009 Portion

Applicant: University of Hawaii

Consultant: Munekiyo & Hiraga, Inc. (808-244-2015)

Please review the document pertaining to the subject matter and submit your comment (if any) on Division letterhead signed and dated by the suspense date.

*NOTE: One copy of the document is available for your review in the Land Division Office, Room 220.

Should you need more time to review the document, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

 (\checkmark) We have no comments.

() Comments attached.

Signed:

·· LINDA LINGLE COVERNOR OF HAWAII



P'ETER T. YOUNG ('CÀMPERSON LAND AND NATURAL RESOURCES ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON

ERNEST Y.W. LAU



STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES LAND DIVISION

POST OFFICE BOX 621 HONOLULU, HAWAII 96809 AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LIAND
STATE PARKS

April 2, 2004

LD/NAV

Ref.: UHMAUITECHCTN.CMT

Suspense Date: 4/13/04

L-1772

MEMORANDUM:

TO:

Division of Aquatic Resources

*XXX Division of Forestry & Wildlife

*XXX Division of State Parks

Na Ala Hele Trails

Division of Boating and Ocean Recreation Commission on Water Resource Management

*XXX Commission on Water Resource Management *XXX Office of Conservation and Coastal Lands

*XXX Engineering Division

*XXX Land-Maui District Land Office (DD)

*XXX Land-Planning and Development

*XXX Land-Project Development Specialist

FROM:

dens Dierdre S. Mamiya, Administrator

Land Division

SUBJECT: Proposed Advance Technology Center and Advance Technology

Research Center. TMK: (2) 2-3-008 and 009 Portion

Applicant: University of Hawaii

Consultant: Munekiyo & Hiraga, Inc. (808-244-2015)

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Should you need more time to review the document, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(We have no comments.

() Comments attached.

Signed: Jam K. Ky

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RATURAL RESOURCES

STATE OF HAWAII

STATE OF HAWAII DEPT. OF LAREPARTMENT OF LAND AND NATURAL RESOURCES LAND DIVISION

> **POST OFFICE BOX 621** HONOLULU, HAWAII 96809

PETER T. YOUNG CHAINFERSON
BOARD OF LAND AND INTURAL RESOURCES
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DAN DAVIDSON DEFUTY DIRECTOR - LAND

ERNEST Y.W. LAU DEPUTY DIRECTOR - WATER

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COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
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FORCESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND

EAND STATE PARKS

April 2, 2004

LD/NAV

Ref.: UHMAUITECHCTN.CMT

L-1772

Suspense Date: 4/13/04

MEMORANDUM:

TO:

Division of Aquatic Resources *XXX Division of Forestry & Wildlife

*XXX Division of State Parks

Na Ala Hele Trails

Division of Boating and Ocean Recreation

*XXX Commission on Water Resource Management *XXX Office of Conservation and Coastal Lands

*XXX Engineering Division

*XXX Land-Maui District Land Office (DD)

*XXX Land-Planning and Development

*XXX Land-Project Development Specialist

FROM:

densy Dierdre S. Mamiya, Administrator

Land Division

SUBJECT: Proposed Advance Technology Center and Advance Technology

Research Center. TMK: (2) 2-3-008 and 009 Portion

Applicant: University of Hawaii

Consultant: Munekiyo & Hiraga, Inc. (808-244-2015)

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Should you need more time to review the document, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense dat/e, we will assume there are no comments.

We have no comments.

() Comments attached

MICHAEL G. BUCK, ADMINISTRATOR APR - 6 2004 DIVISION OF FORESTRY AND WILDLIFE

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DAN DAVIDSON DEPUTY DIRECTOR - LAND

PETER T. YOUNG

ERNEST Y.W. LAU DEPUTY DRECTOR - WATER

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2004 APR 12 P 2: 26 STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES
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POST OFFICE BOX 621 HONOLULU, HAWAII 96809

April 2, 2004 4/6

LD/NAV

Ref.: UHMAUITECHCTN.CMT

L-1772 Suspense Date: 4/13/04

MEMORANDUM:

TO:

Division of Aquatic Resources

*XXX Division of Forestry & Wildlife

*XXX Division of State Parks

Na Ala Hele Trails

Division of Boating and Ocean Recreation

*XXX Commission on Water Resource Management

*XXX Office of Conservation and Coastal Lands

*XXX Engineering Division

*XXX Land-Maui District Land Office (DD)

*XXX Land-Planning and Development

*XXX Land-Project Development Specialist dus

FROM:

Dierdre S. Mamiya, Administrator

Land Division

SUBJECT: Proposed Advance Technology Center and Advance Technology

Research Center. TMK: (2) 2-3-008 and 009 Portion

Applicant: University of Hawaii

Consultant: Munekiyo & Hiraga, Inc. (808-244-2015)

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Should you need more time to review the document, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

() We have no comments.

(Comments attached.

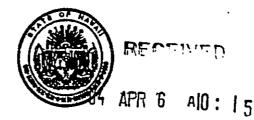
Signed:

DEPARTMENT OF LAND AND NATURAL RESOURCES ENGINEERING DIVISION

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Ref.: UHMAUITECHCTN.CMT

<u>MENTS</u>
We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone C.
Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is
located in Zone Please note that the correct Flood Zone Designation for the project site according to the Flood
Insurance Rate Map (FIRM) is Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.
Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below: () Mr. Robert Sumimoto at (808) 523-4254 or Mr. Mario Siu Li at (808) 523-4247 of the City and County of Honolulu, Department of Planning and Permitting. () Mr. Kelly Gomes at (808) 961-8327 (Hilo) or Mr. Kiran Emler at (808) 327-3530 (Kona) of the County of Hawaii, Department of Public Works. () Mr. Francis Cerizo at (808) 270-7771 of the County of Maui, Department of Planning. () Mr. Mario Antonio at (808) 241-6620 of the County of Kauai, Department of Public Works.
The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.
The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.
Additional Comments:
Other:
Signed: Andrew Monden of the Planning Branch For ERIC T. HIRANO, CHIEF ENGINEER Date: 4/8/04



DAN DAVIDSON DEPUTY DIRECTOR - LAND

ERNEST Y.W. LAU DEPUTY DRECTOR - WATER

BOATHS AND CCEAN RECREATION BURGAU OF CONVEYANCES COMMISSION ON WATER RESOURCE MANAGEM ENGNEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION

STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES TAND DIVISIBRACE SCE HI THEHEIT

POST OFFICE BOX 621 HONOLULU, HAWAII 96809

April 2, 2004

LD/NAV

Ref.: UHMAUITECHCTN.CMT

L-1772

Suspense Date: 4/13/04

MEMORANDUM:

Division of Aquatic Resources TØ: *XXX Division of Forestry & Wildlife *XXX Division of State Parks Na Ala Hele Trails Division of Boating and Ocean Recreation *XXX Commission on Water Resource Management_ *XXX Office of Conservation and Coastal Langing *XXX Engineering Division *XXX Land-Maui District Land Office (DD) *XXX Land-Planning and Development *XXX Land-Project Development Specialist dens Dierdre S. Mamiya, Administrator

SUBJECT: Proposed Advance Technology Center and Advance Technology Research Center. TMK: (2) 2-3-008 and 009 Portion

Applicant: University of Hawaii

Consultant: Munekiyo & Hiraga, Inc. (808-244-2015)

Please review the document pertaining to the subject matter and submit your comment (if any) on Division letterhead signed and dated by the suspense date.

*NOTE: One copy of the document is available for your review in the Land Division Office, Room 220.

Should you need more time to review the document, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(X) We have no comments.

Land Division

() Comments attached.

Signed: Dal WHy

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STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES LAND DIVISION

POST OFFICE BOX 621 HONOLULU, HAWAII 96809

PETER T. YOUNG CHARPERSON
BOAND OF LAND AND NATURAL REBOURCES
COMMESSION ON WATER REBOURCE MANAGEMENT

DAN DAYIDSON DEPUTY DIRECTOR - LAND

ERHEST Y.W. LAU DEPUTY DRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONNEYANCES
COMMISSION ON WATER RESOURCES MANGEMENT
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ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVATION
LANC
STATE PARKS

April 2, 2004

LD/NAV

Ref.: UHMAUITECHCTN.CMT

L-1772 Suspense Date: 4/13/04

MEMORANDUM:

TO:

Division of Aquatic Resources *XXX Division of Forestry & Wildlife

*XXX Division of State Parks

Na Ala Hele Trails

Division of Boating and Ocean Recreation

*XXX Commission on Water Resource Management

*XXX Office of Conservation and Coastal Lands

*XXX Engineering Division

*XXX Land-Maui District Land Office (DD)

*XXX Land-Planning and Development

*XXX Land-Project Development Specialist

FROM:

dus Dierdre S. Mamiya, Administrator

Land Division

SUBJECT: Proposed Advance Technology Center and Advance Technology

Research Center. TMK: (2) 2-3-008 and 009 Portion

Applicant: University of Hawaii

Consultant: Munekiyo & Hiraga, Inc. (808-244-2015)

Please review the document pertaining to the subject matter and submit your comment (if any) on Division letterhead signed and dated by the suspense date.

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Should you need more time to review the document, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(X) We have no comments.

() Comments attached.

Signed: 4/6/04

LINDA LINGLE



STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION KAKUHIHEWA BUILDING, ROOM 555 601 KAMOKILA BOULEVARD KAPOLEI, HAWA!I 96707 PETER T. YOUNG 5 200 CHARPERSON BOARD OF LIND AND ATTURAL RESOURCES COMMISSION ON WATER REPORTING MANAGEMEN

DAN DAVIDSON DEPUTY DIRECTOR - LAND

ERNEST Y.W. LAU DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES BHFORCEMENT
ENGUNEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

April 30, 2004

Glenn Tadaki Munekiyo & Hiraga, Inc. 305 South High Street, Suite 104 Wailuku, Hawaii 96793 LOG NO: 0224.1361 DOC NO: 0404CD75

Dear Mr. Tadaki,

SUBJECT:

Chapter 6E-8 Historic Preservation Review - Draft Environmental Assessment for the Proposed

Advanced Technology Center and Advanced Technology Research Center

'A'apueo Ahupua'a, Makawao District, Island of Maui

TMK: (2) 2-3-008:038 and 039 (por.)

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (Draft EA) for the Proposed Advanced Technology Center and Advanced Technology Research Center (ATRC) which was received by our staff March 22, 2004. Based on the submitted Draft EA, we understand the proposed undertaking consists of the construction of the ATRC on a 3.4 acre lot located within the Kulamalu Town Center Subdivision (aka Kulamalu Commercial Subdivision). We note that if there is Federal involvement, including funding, in the proposed action, the responsible Federal agency will need to ensure that the compliance with Section 106 of the National Historic Preservation Act has been carried out.

In 1996, PHRI conducted an archaeological inventory survey which included the proposed project area (*Archaeological Inventory Survey, 44-Acre Pukalani Terrace Subdivision III, Land of `A`apueo, Makawao District, Island of Maui.* Wulzen et al. 1996). Although four historic sites were identified during the survey, none are located in the project area. Given the above information, we believe there will be "no historic properties affected" by the proposed undertaking.

In the event that historic sites (human skeletal remains, etc.) are identified during the construction activities, all work needs to cease in the immediate vicinity of the find, the find needs to be protected from additional disturbance, and the State Historic Preservation Office needs to be contacted immediately at 243-5169, on Maui, or at (808) 692-8023, on O'ahu.

If you have any questions, please call Cathleen A. Dagher at 692-8023.

Aloha,

P. Holly McEldowney, Administrator
State Historic Preservation Division

CD:jen

c: Michael Foley, Director, Dept of Planning, 250 S. High Street, Wailuku, HI 96793
Maui Cultural Resources Commission, Dept of Planning, 250 S. High Street, Wailuku, HI 96793

ALAN M. ARAKAWA Mayor

GILBERT S. COLOMA-AGARAN Director

MILTON M. ARAKAWA, A.I.C.P. Deputy Director

Telephone: (808) 270-7845 Fax: (808) 270-7955



COUNTY OF MAUI DEPARTMENT OF PUBLIC WORKS AND ENVIRONMENTAL MANAGEMENT

200 SOUTH HIGH STREET WAILUKU, MAUI, HAWAII 96793

June 14, 2004

JUN 17 2004

RALPH NAGAMINE, L.S., P.E. Development Services Administration

TRACY TAKAMINE, P.E. Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E. Engineering Division

BRIAN HASHIRO, P.E. Highways Division

JOHN D. HARDER Solid Waste Division

Mr. Glenn Tadaki MUNEKIYO & HIRAGA, INC. 305 High Street Suite 104 Wailuku, Maui, Hawaii 96793

Dear Mr. Tadaki:

SUBJECT:

DRAFT ENVIRONMENTAL ASSESSMENT

PROPOSED ADVANCED TECHNOLOGY CENTER AND ADVANCED TECHNOLOGY RESEARCH CENTER

TMK: (2) 2-3-008:038, 039 (POR.)

We reviewed the Draft Environmental Assessment and have the following comments:

- 1. The plans submitted for this project do not adequately show sufficient detail to determine whether the project is compliant with building codes. We will review the project for building code requirements during the building permit application process.
- 2. The grading for the project shall comply with the provisions of the grading ordinance. Best Management Practices (BMP) shall be implemented to the maximum extent practicable to prevent pollutants including dust and sediment from discharging off the project site.
- 3. The drainage system design shall comply with the provisions of the drainage rules and shall create no additional adverse effects to adjacent and downstream properties.
- A detailed and final drainage report and a Best Management Practices Plan shall be submitted with the grading plans for review

Mr. Glenn Tadaki June 14, 2004 Page 2

and approval prior to issuance of grading permits. The drainage report shall include hydrologic and hydraulic calculations and the schemes for disposal of runoff waters. It must comply with the provisions of the "Rules and Design of Storm Drainage Facilities in the County of Maui" and must provide verification that the grading and runoff water generated by the project will not have an adverse effect on adjacent and downstream properties. The BMP plan shall show the location and details of structural and non-structural measures to control erosion and sedimentation to the maximum extent practicable.

 A sight distance analysis for each connection onto Ohi`a Ku Street shall be submitted for review and approval.

If you have any questions regarding this letter, please call Milton Arakawa at (808) 270-7845.

Very truly yours,

GILBERT S. COLOMA-AGARAN

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Director

GSCA:MA:SW S:\LUCA\CZM\Draft Comments\23008038-039_Advanced Reasearch_Ctr_dea_sw.wpd



June 22, 2004

Gilbert S. Coloma-Agaran, Director Department of Public Works and Environmental Management 200 South High Street Wailuku, Hawaii 96793

SUBJECT: Proposed Advanced Technology Center and Advanced Technology

Research Center; TMK 2-3-08: 38 and 39 (por.)

Dear Mr. Coloma-Agaran:

Thank you for your June 14, 2004 letter commenting on the subject's Draft Environmental Assessment (EA). On behalf of the applicant, the University of Hawaii, Institute for Astronomy, we would like to note the following.

- 1. The applicant acknowledges that the project's compliance with building code requirements will be reviewed during the building permit application process.
- 2. Site grading and the implementation of Best Management Practices will be conducted in accordance with the provisions of Chapter 20.08 of the Maui County Code regarding "Soil Erosion and Sedimentation Control".
- 3. The drainage system for the project will be designed in accordance with the "Rules for the Design of Storm Drainage Facilities in the County of Maui".
- 4. A detailed drainage report, along with grading plans for the project, will be submitted to the department for review and approval prior to the issuance of a grading permit.
- 5. A sight distance analysis for the project's driveway connection at Ohi`a Ku Street will be submitted to the department for review and approval.

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305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

Gilbert S. Coloma-Agaran, Director June 22, 2004 Page 2

Thank you again for providing us with your comments. Please feel free to call me should you have any questions.

Very truly yours,

Glenn Tadaki, Planner

GT:yp

cc: Jan Yokota, University of Hawaii
Don Fujimoto, Kulamalu Science, LLC



DEPARTMENT OF WATER SUPPLY

COUNTY OF MAUI

200 South High Street
WAILUKU, MAUI, HAWAII 96793
Telephone (808) 270-7816 • Fax (808) 270-7833

June 15, 2004

Munekiyo & Hiraga, Inc. 305 High, Suite 104 Wailuku, Hawaii 96793

SUBJECT:

Proposed Advanced Technology Center and Advanced Technology Research Center -

Draft Environmental Assessment, TMK: (2)2-3-08:038 & 039

Dear Mr. Munekiyo:

Thank you for the opportunity to review this project proposal.

According to the agreement entered into by Kulamalu Inc. and the Board of Water Supply, whenever Kulamalu desires to use any credits or allocate credits specifically to a portion of, or development within a property, Kulamalu will notify the Board by means of a signed statement in substantially the form attached as Schedule G.

In Appendix B of the project document, preliminary water demand calculations indicate an average daily demand of 17,070 gallons. On March 12, 2004, the applicant met with DWS staff to discuss source allocation for the commercial projects in the development area. The source allocation requested for this project was 12,558 gallons based on average daily demand. We ask that Notice of Exercise of Credits for the correct amount be submitted to DWS by the applicant for this project.

In the event that credits are inadequate or has been exhausted, DWS will not be able to approve Building Permit application for this project. The applicant will need to request placement of the property on the Upcountry meter priority list and wait for meters. If storage is inadequate, the applicant has to pay the storage portion of the Water System Development Fee. Similarly, if transmission is inadequate, the applicant has to pay the transmission portion of the Water System Development Fee for transmission improvements.

We encourage the applicant to integrate water conservation measures as well as adopt Best Management Practices (BMPs) in the project design and construction. This information was provided to the applicant during the early consultation process for an EA for this project.

Should you have any questions, please contact our Water Resources and Planning Division at 270-7199.

Sincerely,

George Y. Tongan Director

eam



June 22, 2004

George Y. Tengan, Director Department of Water Supply 200 South High Street Wailuku, Hawaii 96793

SUBJECT: Proposed Advanced Technology Center and Advanced Technology

Research Center; TMK 2-3-08:38 and 39(por.)

Dear Mr. Tengan:

Thank you for your June 15, 2004 letter commenting on the subject's Draft Environmental Assessment (EA). On behalf of the applicant, the University of Hawaii, Institute for Astronomy, we would like to note the following.

- 1. Kulamalu Inc. will notify the Board of Water Supply, in writing, of its intent to allocate source credits for the proposed project.
- As there are sufficient source credits available, the Notice of Exercise of Credits for the requested source allocation of 12,558 gallons per day will be submitted to the department.
- 3. Appropriate water conservation measures will be employed for the project. Examples of such measures include, but are not limited to, the use of low-flow plumbing fixtures, maintenance of fixtures to prevent leaks, use of rain sensors on automated irrigation controllers, elimination of single-pass cooling systems, and the use of climate-adapted plants. Best Management Practices (BMPs) will be implemented during construction to minimize infiltration and runoff from construction-related activities. The BMPs will be prepared in accordance with County standards and will be included in the civil drawings and grading permit application submittals for the project.

environment

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George Y. Tengan, Director June 22, 2004 Page 2

Thank you again for providing us with your comments. Please feel free to call me should you have any questions.

Very truly yours,

Glenn Tadaki, Planner

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SUMMARY OF MEETING WITH KULA COMMUNITY ASSOCIATION'S BOARD OF DIRECTORS

On May 11, 2004, the applicant met with the Kula Community Association's (KCA) board of directors to provide them with a current overview of the proposed project. In addition to questions about the function of the proposed IFA facility, discussions that surfaced at this meeting encompassed planned land uses and improvements within the Kulamalu Town Center Subdivision; disposition of the IFA's existing Waiakoa facility; project lighting; colors, signage, and landscaping; and views from Kula Highway.

The applicant noted that a parking area, a skilled nursing facility, and a keiki zoo are land uses that are presently planned within the subdivision. Curbs, gutters, and sidewalks, as well as benches, tree wells, and bike racks will be installed within the subdivision. Lighting from the project's buildings and parking lot will be appropriately shielded and downward directed to minimize impacts to surrounding and downslope properties. The color palette for the project will utilize neutral, complementary colors that are compatible with its rural environs. The IFA's existing Waiakoa facility will continue to be used but its primary function will be for equipment storage and vehicle maintenance purposes. To the extent possible, drought-tolerant plants will be utilized for project landscaping. Signage for the project will be low-key and nondescript in keeping with its rural setting. Due to its downslope location, the new IFA facility will not be on the same horizontal view plane as Kula Highway. In summary, the KCA was pleased with the applicant's plans for the proposed IFA facility.

References

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References

County of Maui, Office of Economic Development, <u>Maui County Data Book 2001</u>, June 2001.

Department of Geography, University of Hawaii, Atlas of Hawaii, Third Edition, University of Hawaii Press, 1998.

Federal Emergency Management Agency, <u>Flood Insurance Rate Map Community-Panel Number 150003/0260B</u>, June 1, 1981.

Munekiyo & Arakawa, Inc., <u>Final Environmental Assessment - Kulamalu Project</u>, July 1997.

Munekiyo, Arakawa & Hiraga, Inc., <u>Final Environmental Assessment - Kulamalu Water Tank and Associated Waterline and Appurtenant Improvements</u>, March 1999.

University of Hawaii, Land Study Bureau, <u>Detailed Land Classification - Island of Maui,</u> L.S.B. Bulletin No. 7, May 1967.

U.S. Soil Conservation Service, <u>Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii</u>, U.S. Government Printing Office, 1972.

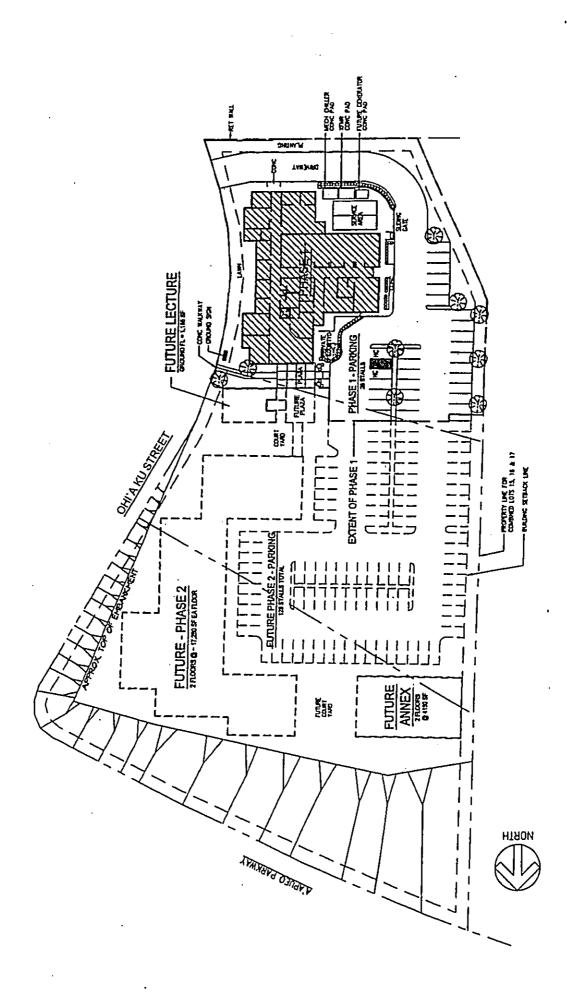
SMS, <u>Maui County Community Plan Update Program: Socio-Economic Forecast-Phase I Report</u>, Final Version (June 14, 2002).

Appendices

7

Appendix A

Preliminary Development Plans



INSTITUTE FOR ASTRONOMY - PHASE 1

SITE PLAN

KOBER/HANSSEN/MITCHELL ARCHITECTS

SCALE: 1" = 50'-0"

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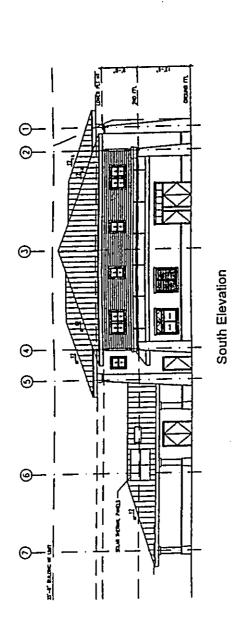
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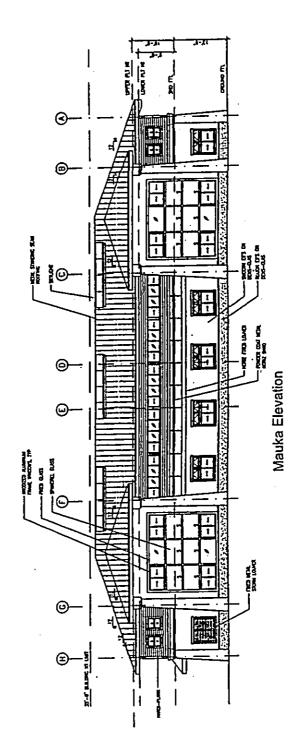
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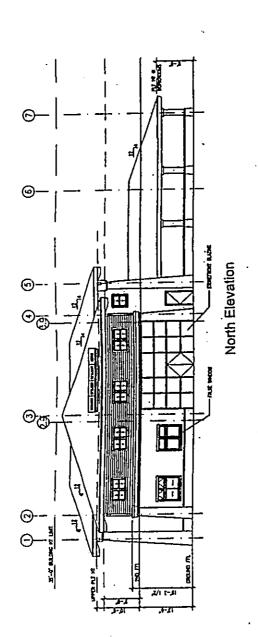




INSTITUTE FOR ASTRONOMY - PHASE 1

EXTERIOR ELEVATIONS

KOBER / HANSSEN / MITCHELL ARCHITECTS



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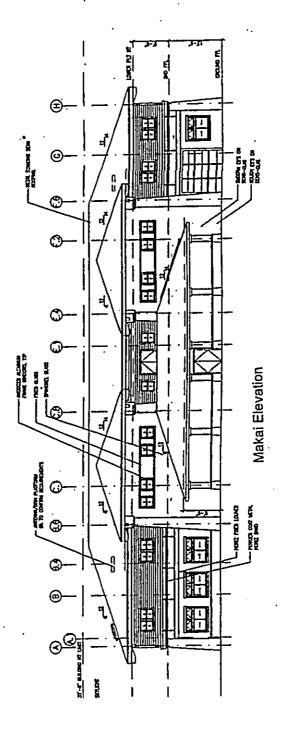
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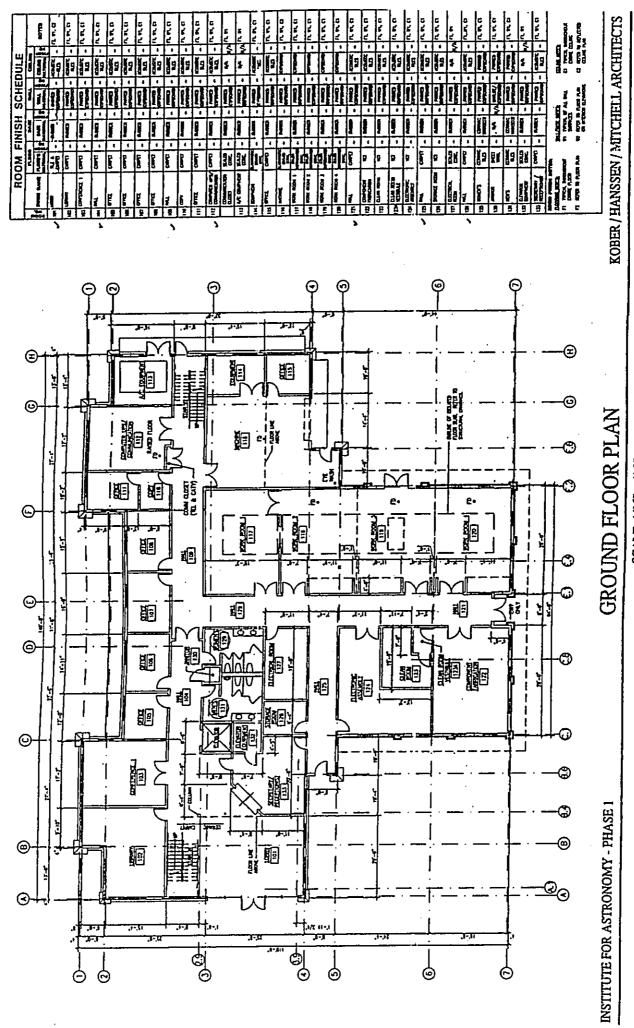
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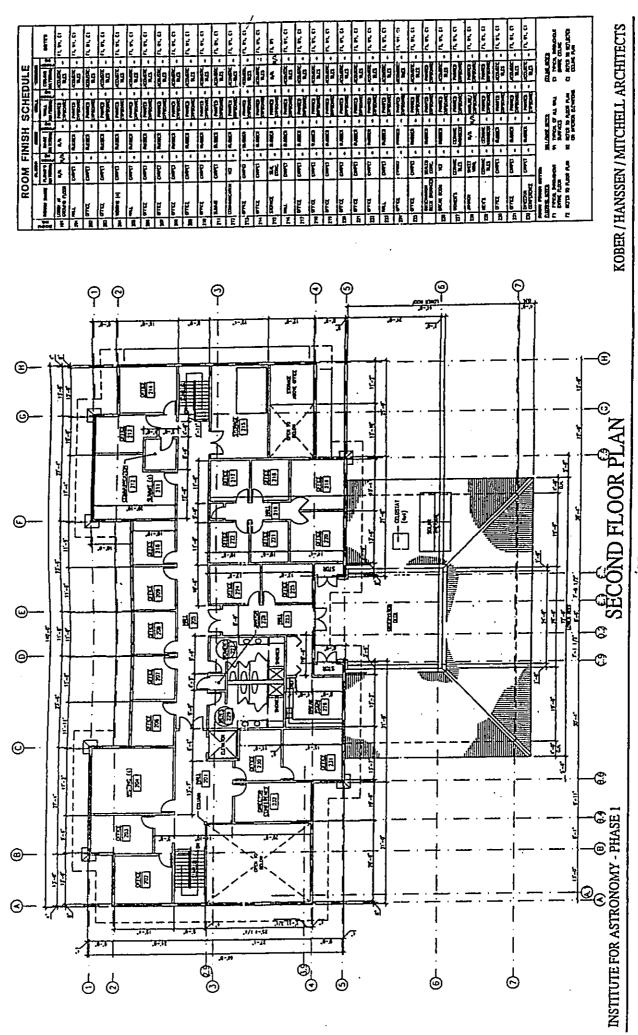
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EXTERIOR ELEVATIONS

KOBER / HANSSEN / MITCHELL ARCHITECTS



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Appendix B

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Preliminary Engineering Report

TABLE OF CONTENTS

PRELIMINARY ENGINEERING REPORT

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	I. INTRODUCTION	II. PROPOSED PROJECT	A. Location B. Project Description	III. EXISTING CONDITIONS
FOR	INSTITUTE FOR ASTRONOMY	ADVANCED TECHNOLOGY CENTER (PHASE 1)	AND	ADVANCED TECHNOLOGY AND RESEARCH CENTER (PHASE 2)

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Topography and Soil Conditions Infrastructure
1. Water
2. Sewer
3. Drainage
4. Roadway

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Kohoila, Kula, Maui, Hawaii TMK: (2) 2-3-08: 38 and Por. 39 ပ

Developer: Kulamalu Science LLC

Rev. January 2004 Rev. March 2003 October 2002

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PROPOSED INFRASTRUCTURE IMPROVEMENTS	A. Grading and Drainage Plan B. Water System C. Sewer System	CONCLUSION
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PRELIMINARY ENGINEERING REPORT

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INSTITUTE FOR ASTRONOMY ADVANCED TECHNOLOGY CENTER (PHASE 1)

ADVANCED TECHNOLOGY AND RESEARCH CENTER (PHASE 2)

I. INTRODUCTION

The purpose of this report is to provide an overview of the engineering design for the Institute for Astronomy-Phases 1 and 2 project in Kula, Maul. This report evaluates the existing site conditions and defines requirements for grading, drainage, sewer, and water utilities, along with other miscellaneous site improvements.

PROPOSED PROJECT

Location

The proposed project is located within Lots 15, 16, and 17 of the Kulamalu Commercial Subdivision within Tax Map Key (2) 2-3-08: 38 and Portion of 39. Phase 1 is situated on Lot 15 and a portion of Lot 16. Phase 2 (future) is situated on Lot 17 and the remaining portion of Lot 16. The project site is bounded by A'Apuero Parkway to the north, Ohi'a Ku Street to the east, Lot 18 (a proposed 12 lot residential lot subdivision to the west. The current landowner is Kulamalu Scence LLC. Refer to Exhibit 1 for location and Vicinity Map.

Project Description

The proposed project consists of two phases. Phase 1 consists of a 15,865 square foot (two story) main building, 28 parking stalls, landscaping and related site work. The building in Phase 1 shall consist of offices, an observation deck, laboratory facilities, etc. Phase 2, which is a future phase, will consist of a 34,560 square foot (two story) building, an 1,168 square foot

lecture building, an 8,300 square foot annex, and approximately 100 additional parking stalls. The total project area is approximately 3.4 acres. Access to the proposed project site from Kula Highway will be provided through A'Apueo Parkway and Ohi'a Ku Street. Refer to Exhibit 2 for Preliminary Site Pian.

On-site improvements include clearing and grubbing of the site, excavation and embankment for construction of the parking area and a building pad, construction and installation of water, sewer, and drainage utilities. Off-site improvements include water, sewer and electrical connections from Ohira Ku Street. All infrastructure work will conform to the "Standard Specifications" and "Standard Details" of the Department of Public Works, County of Maut.

III. EXISTING CONDITIONS

A. Topography and Soil Conditions

The site is currently covered with grass and hydromulch from the recent construction activity for the Kulamalu Town Cneter Subdivision (also known as the Kulamalu Commercial Subdivision. Elevations on the project site range between 1774 feet mean sea level (msl) and 1752 feet msl. Slopes within the project site are approximately 3 percent. There are two different soil classifications on the project site: Keahua Cobbly Silty Clay, 7 to 15 percent slopes (KnhC) and Keahua Cobbly Silty Clay Loam, 15 to 25 percent slopes (KnaD). The Keahua series consists of well-drained soils found on the upland areas of Maui. Runoff is slow to moderate and the erosion hazard varies from slight to moderate.

Soli classifications and descriptions are based on the United States Department of Agriculture (USDA) Soli Conservation Service's (SCS) publication, "Soil Survey of the Islands of Kaual, Oahu, Maul, Molokai, and Lanai, State of Hawali, dated August 1972.

B. Infrastructure

Water

Existing 12" ductile iron county waterlines are located within A'Apueo Parkway and Ohi'a Ku Street. There are existing fire hydrants surrounding the project site. Water service (3/4-inch laterals) are available for each of the lots.

Sewer

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The site currently generates no wastewater flow. An existing sewer system is located within Ohi'a Ku Street and A'Apueo Parkway. Sewer service laterals are available for each of the lots.

Drainage

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Onsite storm water runoff within the project site generally sheet flows in a northwesterly direction towards. Lot 17. It eventually flows towards an existing underground drainage system within A'Apueo Parkway. There is an existing underground drainage system within Ohi'a Ku Street.

Existing on-site runoff is estimated at approximately 1.32 cubic feet per second (cfs) and 3.16 cfs for Phases 1 and 2, respectively, it is based on a 50 Yr – 1 Hr storm recurrence interval. Refer to Appendix A for Preliminary Hydrology Computations.

Roadway

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The proposed project is situated along the 60' wide (right-of-way) Ohl'a Street. The typical roadway section for Ohl'a Street consists of a 40' wide pavement, curb to curb.

C. Flood Zone

The project site sits in a designated Flood Zone "C". Flood Zone "C" is described as an area of minimal flooding. Flood zone information is obtained from the Federal Emergency Management Agency, Flood Insurance Rate Map (FIRM), Panel No. 150003-

0260B, dated June 1, 1981. Refer to Exhibit 5 for the Flood Zone Map.

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PROPOSED INFRASTRUCTURE IMPROVEMENTS

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A. Grading and Drainage Plan

The project will require excavation and embankment for the proposed buildings and parking lot in Phase 1. The site will be graded to maintain the existing northwesterly drainage pattern and for the future buildings and parking lot for Phase 2. An off-site retention basin has been designed to accommodate post development flow. The on-site drainage system improvements will consist of installation of grated drain inlets, manholes and under ground drainlines.

Post development flow from the project site is calculated at approximately 4.46 ds and 7.25 ds for Phases 1 and 2, respectively. Hydrology calculation is based on a 50 Yr – 1 Hr storm recurrence interval. Refer to Appendix A for Preliminary Hydrology Computations. The proposed drainage system for the project site will be designed to maintain the predevelopment discharge rate and prevent adverse effect to the downstream properties. Refer to Exhibit 4 for Preliminary Grading and Drainage Plan.

Water

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Water service is available to the project site. Preliminary water demand estimates require an average daily demand of approximately 2,220 gallons per day (gpd) and 6,200 gpd for Phases 1 and 2, respectively. Refer to Appendix B for Preliminary Water Demand Computations.

C. Sewer

A new sewer system will be installed within the project site to provide sewer service to the buildings. Preliminary wastewater contributions are calculated at approximately 2,000 gpd (average daily demand) and 5,500 gpd for Phases 1 and 2, respectively. Refer to Appendix C for Preliminary Wastewater Computations.

EXISTING ON-SITE HYDROLOGY CALCULATIONS (50 Year - 1 Hour Storm)

ADVANCE TECHNOLOGY CENTER (PHASE 1)

Project Site Description:

Runoff Coefficient (c)

The proposed improvements for this project will be designed to produce no adverse effects to existing facilities and to the surrounding environment. All improvements will be designed in accordance with the rules and regulations of all applicable agencies.

CONCLUSION

Site description: Grassed and hydromulched, unimproved

c = 0.30

Area (a)

a = 0.977 acres

Reinfall Intensity (I)

50 Yr - 1 Hr = 3.0 inches Recurrence Interval:

3.0 % Average site slope: 16.0 minutes Time of concentration;

approximately 230 feet

Longest reach length:

i = 4.5 laches / bour

Runoff (O)

Q-cxixa

Q = discharge, in cubic feet per second (cfs)
c = runoff coefficient
i = rainfall intensity, inches per hour
a = watershed area, in acres

Q20 = (0.30)(0.977 acres)(4.5 inches / hour)

-1.32 cfs

Sob Not. NE-00-544 Computed br. AW Date: 10/22/02 Rev. 6/17/03 histura for Astronomy-Advance Technology Center (Phase I) and Advance Research Technology Center (Phase 2). (2) 2-3-08: 33 and Por. 39 훉 Project

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ADVANCE RESEARCH TECHNOLOGY CENTER (PHASE 2)

Project Site Deteription:

Rupoff Coefficient (c)

Site description: Grassed and hydromulched, unimproved

c=030

Area (a)

a = 2,45 acres

Rainfall Intensity (D

50 Yr - 1 Hr - 3.0 inches Recurrence Interval:

9.6 % Average site slope: approximately 500 feet Longest reach length:

18.0 minutes Time of concentration:

i = 43 inches / hour

Runoff (O)

Q=cxixa

Q = discharge, in cubic feet per second (cfs)
c = runoff coefficient
i = rainfall intensity, inches per hour
a = waterabed area, in acres

Qss = (0.30)(2.45 acres)(4.3 inches / hour)

Job Ho: M-00-544 Computed by: AW Date: 10/22/02 Rev. 6/17/03 Institute for Astronomy-Advance Technology Center (Phase I) and Advance Research Technology Center (Phase 2) (2) 2-3-09: 38 and Por. 39 Project TASK:

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POST DEVELOPMENT ON-SITE HYDROLOGY CALCULATIONS

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ADVANCE TECHNOLOGY CENTER PRASE 1)

Profect Site Description:

Area (a)

0.977 acres Total Project Site:

0.317 acres 0.410 acres 0.253 acres Area Breakdown Buildings: 29 Stall Parking Areas: Landscape Areas;

Ranoff Coefficient (c)

c=0.22 c=0.95 Grassed areas: Parking areas: $c = \{0.95(0.317 + 0.410) + 0.22(0.253)\} = 0.76$ 0.977

Rainfall Intensity (

50 Yr - 1 Hr = 3.0 inches Recurrence Interval:

3.0 % Average site slope: Longest reach length: approximately 405 feet

Time of concentration: 6.0 minutes

i = 6.0 inches / hour

Runoff (Q)

Q=oxixa

Q = discharge, in cubic feet per second (cfs) c = runoff coefficient

Job No: IA-02-544 Computed by: ANY Date: 10/22/02 [1 of 3] Rev. 6/17/03 Institute for Astronomy-Advance Technology Center (Phase I) and Advance Research Technology Center (Phase 2) (2) 2-3-08; 38 and Por. 39 JACK:

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i = rainfall intensity, inches per bour a * watershed area, in acres

Q23 - (0.76)(0.977 acres)(6.0 inches / hour)

- 4.46 cfs

ADVANCE RESEARCH TECHNOLOGY, CENTER (PHASE 2)
Project Site Destribition:

Area (a)

2.45 acres Total Project Site:

Area Breakdown:
Buildings:
99 Stall Parking Areas:
Landscape Areas:

0.539 acres 0.672 acres 1.240 acres

Runoff Coefficient (c)

c = 0.22 c = 0.95 Grassed areas: Parking areas: c = (0.95(0,539+0.672)+0.22(1,24)) = 0.58 2.45

Rainfall Intensity (I)

50 Yr - 1 Hr = 3.0 inches Recurence Interval:

% 9.6 Average site slope: Longest reach length: approximately 500 feet

Time of concentration: 11.0 minutes

i = 5.1 inches / hour

Job No: IA-02-544 Computed by: AW Date: 10/22/02 [2 of 3] Rev. 6/17/03 Institute for Astronomy-Advance Technology Center (Phase I) and Advance Rassarch Technology Center (Phase 2) (2) 2-3-03: 38 and Por, 39 Project TMK:

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Runoff (Q)

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.Q = discharge, in cubic feet per second (cfs)
c = ranoff coefficient
i = rainfall intensity, inches per hour
a = watersbed area, in acres

Qo = (0.58)(2.45 acres)(5.1 inches / hour)

institute for Astronomy-Advance Technology Center (Phase I) and Advance Research Technology Center (Phase 2) (2) 2-3-06: 38 and Por. 39 Ę,

Job No. 14-02-544 Computed by: AVI Data: 10/22/02[3 of 3] Ray, 6/17/03

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PRELIMINARY WATER DEMAND CALCULATIONS

ADVANCE TECHNOLOGY CENTER (PHASE 1)

Project Site Description:

Total Project Area = 0.977 acres

Ares (a)

Main Building (Two Story, Total Area=15,561 square feet)
Landscape Area=11,023 s.f.

Average Dally Water Demand Requirements

Commercia Vindustria I Mix 140 gallons / 1,000 square feet (Table 100-18, Water System Standards)

1.5 inches / week or .134 gallons/s.f/day (Estimated)

Landscape

Water Demand Calculation

Average Dally Demand

15,561 s.f. (140 gal/1,000 s.f.) + 11,023 s.f. (.134 gal/ps.f.) = 2,179+ 1,477

= 3,656 gallons per day (gpd), Average Daily Demand Say, 3,660 pgpd

Maximum Daily Demand

Avg. Daily Demand x 1.5 = Maximum Daily Demand

= 3,660 gpd x 1.5

= 5,490 gpd, Maximum Daily Demand

Institute for Astronomy-Advance technology Center (Phase I) and Advance Research Technology Center (Phase Z) (2) 2-3-03: 38 and Por. 39 Š

Job No: M-02-544 Computed by: AW Date: 10/22/02[1 of 2] Rev. 6/17/03

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ADVANCE RESEARCH TECHNOLOGY CENTER (PHASE 2)

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Project Site Description:

Total Project Area - 2.45 acres

Area (a)

Lecture Building (One Story, Total Area=1,168 s.f.)
Future Building (Two Story, Total Area=34,560 square feet)
Future Annex (Two Story, Total Area=8,300 s.f.)
Landscape Area 54,107 s.f.

Averace Dally Water Demand Requirements

Commercial/Industrial Mix 140 gallons / 1,000 square feet (Table 100-18, Water System Standards)

.134 gallons / square feet (Estimated) Landscape

Water Demand Colculation

Average Dally Demand

44,028 s.f. (140 gal/1,000 s.f.) + 54,107 s.f. (.134 gal/s.f.) = 6,164 + 7250

= 13,414 gallons per day (gpd), Average Daily Demand Say, 13,410 gpd

Maximum Dally Demand

Avg. Daily Demand x 1.5 - Maximum Daily Demand

- 13,410 gpd x 1.5

= 20,115gpd, Maximum Daily Demand

Reference: Water System Standards
Departement of Water Supply, County of Maul, 2002 and as amended

hathata for Astronomy-Advance Inchnology Center (Phase I) and Advance Research Technology Center (Phase 2) (2) 2-3-03: 38 and Por, 33 Ě

Job No: M-02-544 Computed by: AW Date: 10/22/02 [2 of 2] Rev. 6/17/03

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PRELIMINARY WASTEWATER CONTRIBUTION CALCULATIONS

Advance Technology Center (Phase 1)

Project Site Description:

Main Building (Two Story, Total Area-15,561 square feet)

Wastewater Contribution Standards:

Office Employees

1 per 200 s.f. of floor area @ 30 gallons / unit / day

Wastewater Contribution Calculations:

15,561 s.f. (1 employee/200 s.f. of floor area) x 30 gal. / unit / day

~ 2,334 gpd, Average Daily Demand Say 2,330 gpd

Advance Research Technology Center (Phase 2)

Project Site Description:

Lecture Building (One Story, Total Area=1,168 s.f.)
Future Building (Two Story, Total Area=34,560 square feet)
Future Annex (Two Story, Total Area=8,300 s.f.)

Wastewater Contribution Standards:

Office Employees

1 per 200 s.f. of floor area @ 30 gallons / unit / day

Wattewater Contribution Calculations:

44,028 s.f. (1 employee/200 s.f. of floor area) x 30 gal. / unit / day

= 6,604 gpd, Average Daily Demand Say, 6,600 gpd

Reservato: Warrewater Flow Standards
Wartewater Reclamation Division, County of Mani, 1993

histitus for Astronomy-Advance Technology Center (Phase I) and Advance Research Technology Center (Phase 2) (2) 2-3-08: 38 and Por. 39 꿃 Project Project

Job No: M-02-544 Computed by: AW Date: 10/22/02 [2 of 2] Rev. 6/17/03

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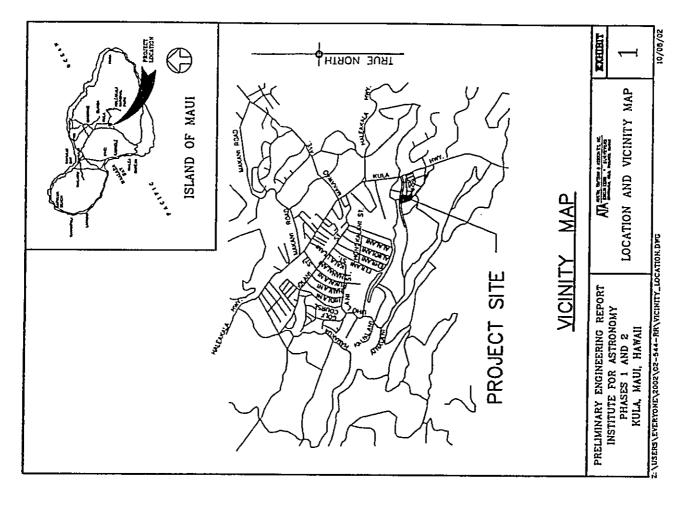
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Job No: M-02-544 Computed by: AW Date: 10/22/02 [1 of 2] Rev. 6/17/03

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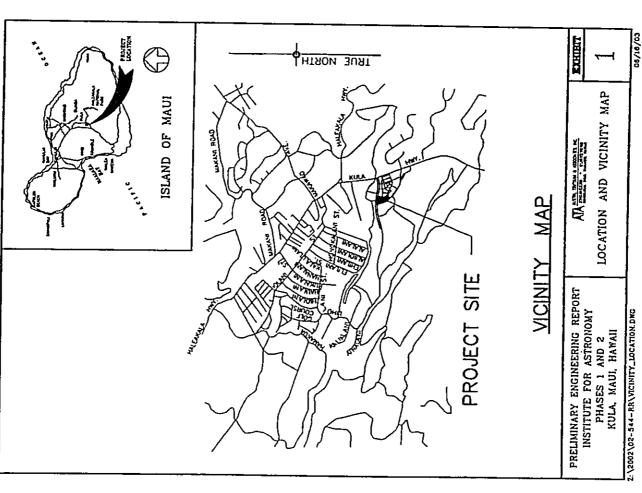
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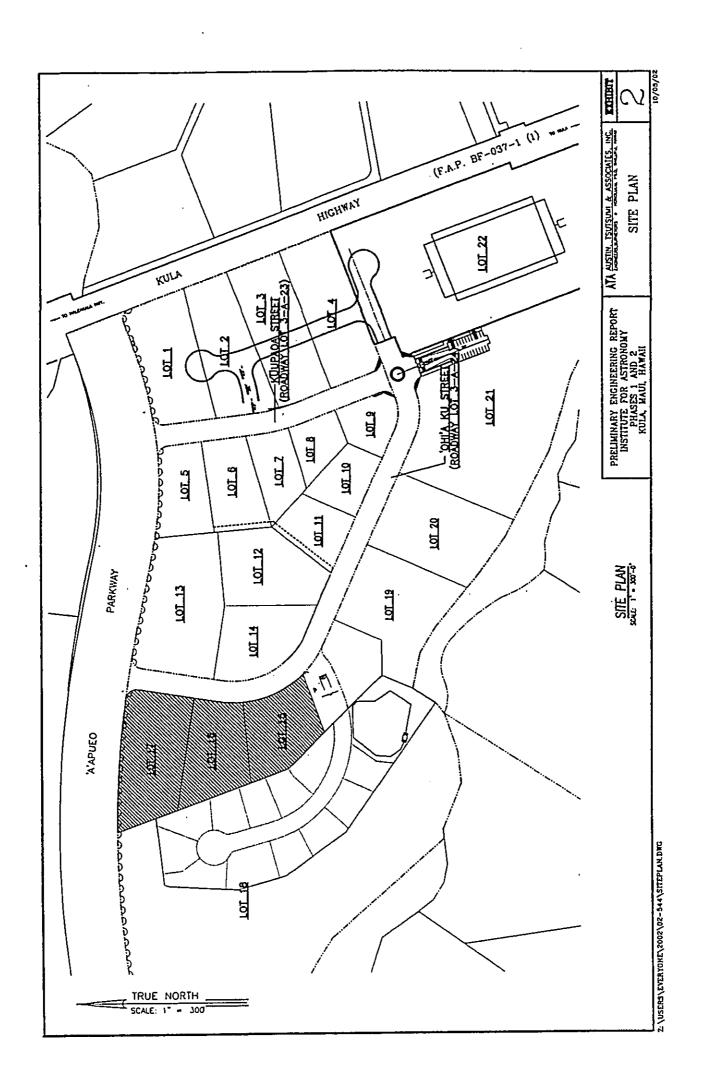
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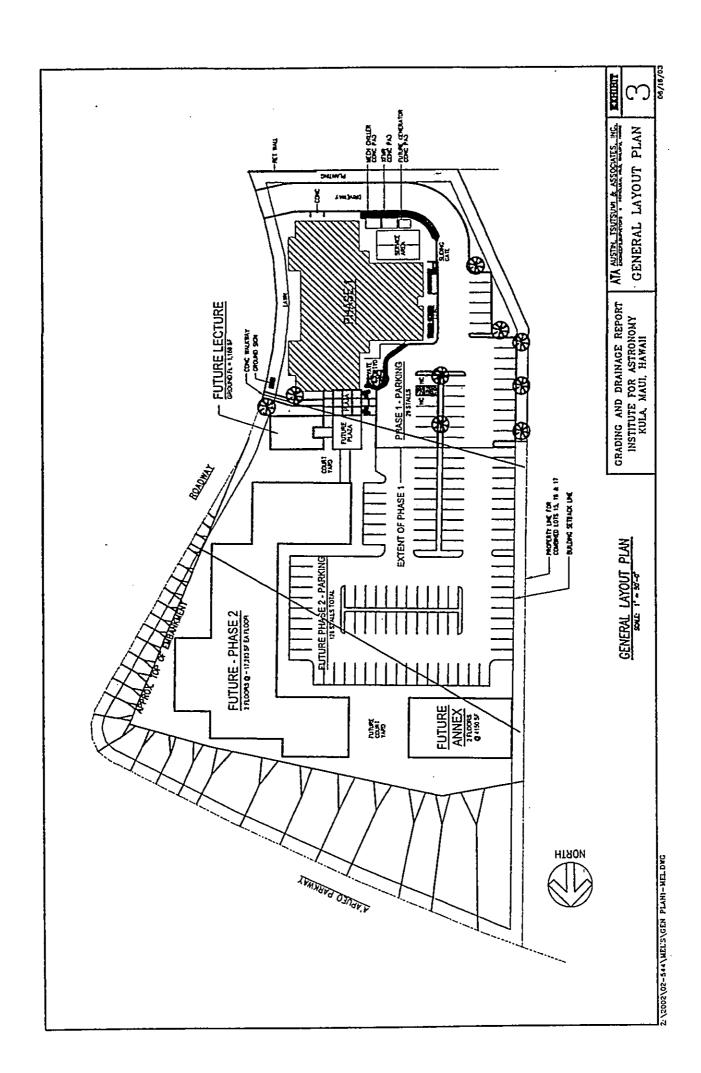


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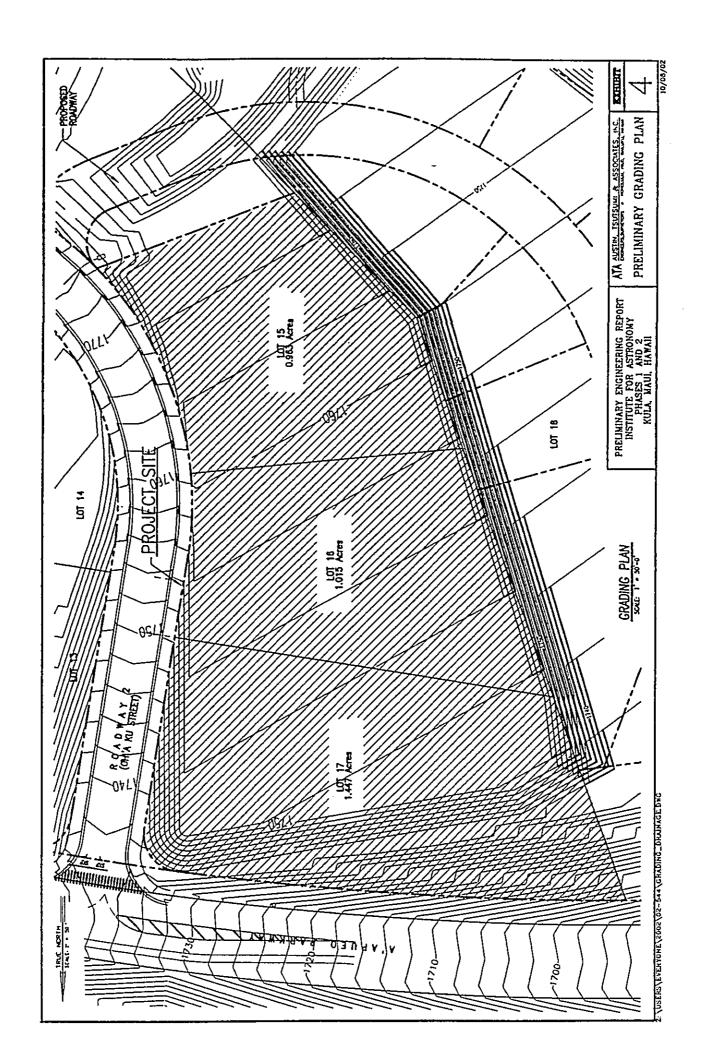
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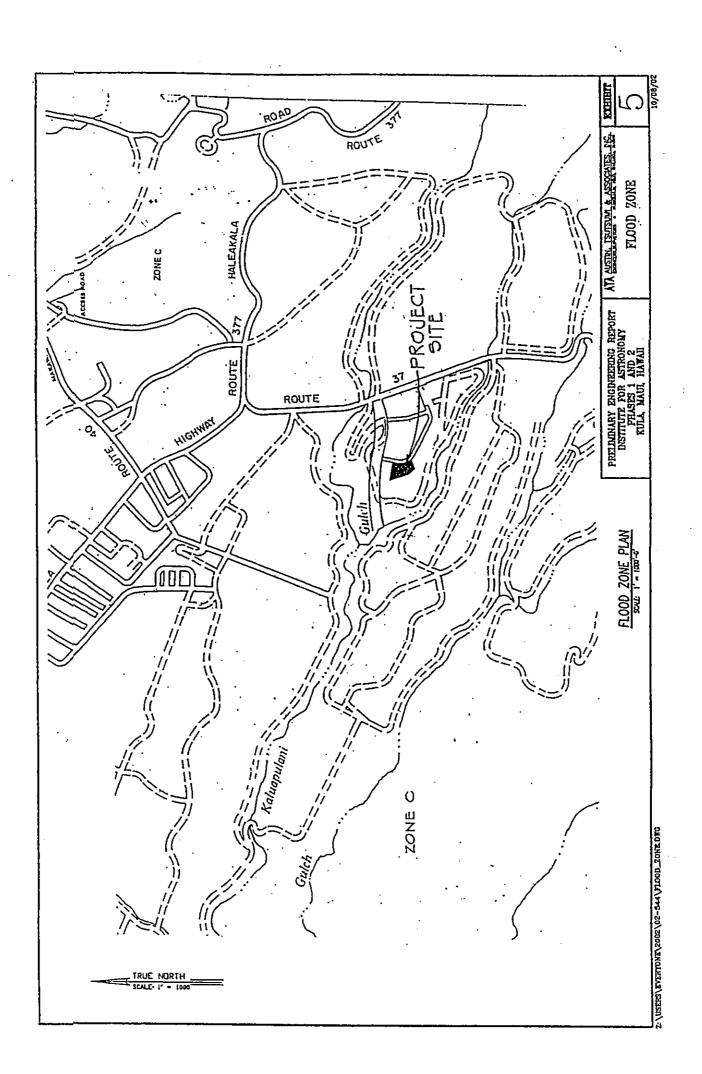
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Appendix C

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Traffic Impact Analysis Report

TRAFFIC IMPACT ANALYSIS REPORT FOR INSTITUTE FOR ASTRONOMY ADVANCED TECHNOLOGY CENTER (PHASE 1) AND ADVANCED TECHNOLOGY AND RESEARCH CENTER (PHASE 2) KOHOILA, KULA, MAUI, HAWAII

January 15, 2004

Prepared for:

Kulamalu Science, LLC 2005 Main Street Wailuku, Hawaii 96793

Austin, Tsutsuml & Associates, Inc. Civil Engineers • Surveyors 501 Sumner Street, Suite 521 Honolulu, Hawaii 96817-5031 Telephone: (808) 533-3646 Facsimile: (808) 526-1267 E-mail: atahil@atahawaii.com Honolulu • Wailuku, Hawaii

TRAFFIC IMPACT ANALYSIS REPORT
FOR INSTITUTE FOR ASTRONOMY
ADVANCED TECHNOLOGY CENTER (PHASE 1)
AND ADVANCED TECHNOLOGY
AND RESEARCH CENTER (PHASE 2)
Kohoila, Kula, Maui, Hawaii

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Prepared for

Kulamalu Science, LLC 2005 Main Street Walluku, Hawail 96793

Prepared by

Austin, Tsutsumi & Associates, Inc. Civil Engineers • Surveyors Honolulu • Wailuku, Hawaii

January 15, 2004

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AUSTWA, TRUTTELIAN E. ARECGATER, P.C. OVA LYGINGER P. RAPATTON	TABLE OF CONTENTS		NTROPICTION		rupose and scope	Froject Lacedon	Project Description	Study Methodology	General	EXISTING CONDITIONS	Roadway System		Study Intersections	Field Observations	Traffic Operations	BASE YEAR TRAFFIC CONDITIONS WITHOUT PROJECT	Base Year 2005 Without Project	Base Year 2005 Traffic Operations	Without Project-Generated Traffic.	Base Year 2005 Traffic Mitigation Measures	Base Year 2006 Wilhout Project	Base Year 2006 Traffic Operations Without Project-Generated Traffic	Base Year 2006 Traffic Mitigation Measures
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58-60 52-54 Page 4 45 45 46 46 47 PEAK HOUR TRIP GENERATION FOR PHASE 1 AND PHASE 2... PEAK HOUR TRIP GENERATION FOR PHASE 2..... TRIP GENERATION EQUATIONS AND RATES FOR PHASE 2 PROJECTED OPERATIONS FOR PHASE 1 PEAK HOUR TRIP GENERATION FOR PHASE 1..... LOS AT STUDY INTERSECTIONS YEAR 2006 WITH PHASE 1 AND PHASE 2 LOS WITH TRAFFIC MITIGATIVE MEASURES LEVEL OF SERVICE CALCULATIONS LOS AT STUDY INTERSECTIONS YEAR 2005 WITH PHASE 1....... LEVEL OF SERVICE CRITERIA TRAFFIC COUNT DATA BASE YEAR 2006 APPENDICES 5 ₹ æ 6 = 5 ∢ 36-39 18-19 26-28 မ 33 24 23 5 53 \$ 48 6 13 2 Page YEAR 2006 TRAFFIC VOLUMES WITH TRAFFIC GENERATED BY PHASE 1 ATC AND PHASE 2 ATRC BASE YEAR 2006 PEAK HOUR OF TRAFFIC TRIPS GENERATED BY THE KNOWN DEVELOPMENTS NEAR THE PROJECT BASE YEAR 2005 PEAK HOUR OF TRAFFIC TRIPS GENERATED BY KNOWN DEVELOPMENTS NEAR THE PROJECT...... TRAFFIC GENERATED BY PHASE 1 ATC AND PHASE 2 ATRC.... YEAR 2005 TRAFFIC VOLUMES WITH TRAFFIC GENERATED BY PHASE 1 ATC ... TRAFFIC GENERATED BY PHASE 1 ATC ONLY ... BASE YEAR 2005 TRAFFIC VOLUMES (WITHOUT PROJECT GENERATED TRAFFIC)..... BASE YEAR 2008 TRAFFIC VOLUMES (WITHOUT PROJECT-GENERATED TRAFFIC).. LOS AT STUDY INTERSECTIONS BASE YEAR 2006 WITHOUT PROJECT LOS AT STUDY INTERSECTIONS BASE YEAR 2005 WITHOUT PROJECT EXISTING TRAFFIC VOLUMES AND LOS ... EXISTING LANE CONFIGURATION..... LOS AT STUDY INTERSECTIONS EXISTING CONDITIONS PROJECT LOCATION. SITE PLAN..... 우 ø TABLES 4 S RES က

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AUSTIN, TSUTSUMI & ASSOCIATES, INC. ON ENGREBB BANEYDES CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1834

TRAFFIC IMPACT ANALYSIS REPORT

ADVANCED TECHNOLOGY AND RESEARCH CENTER (PHASE 2) ADVANCED TECHNOLOGY CENTER (PHASE 1) and KOHOILA, KULA, MAUI, HAWAII INSTITUTE FOR ASTRONOMY

INTRODUCTION A. Purpose an

Purpose and Scope

This study supplements the <u>Kulamalu Traffic Sludy.</u> by Austin, Tsutsumi the ultimate development of the Kulamalu project in Kula, Maui. The traffic Impacts resulting from the ultimate development of the Kamehameha Schools Maui Campus, also located within the Kulamalu project, have been addressed by & Associates, Inc. dated October 1997, which addressed the traffic impacts for the <u>Draft Trafifc Impact Analysis for Kamehameha Schools Mayi Campus,</u> by Philip Rowell and Associates, dated June 20, 2002.

The purpose of this report is to specifically document the findings and recommendations of a traffic study conducted by Austlin, Tsutsumi & Associates, Inc., to evaluate the potential incremental traffic impacts resulting from the development of the Institute for Astronomy's (IFA) proposed Advanced Technology Center (ATC) and Advanced Technology and Research Center (ATRC), herein after collectively referred to as the "Project". This traffic study is being specifically conducted as a requirement for the Project as part of the Environmental Assessment process.

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Project Location œ.

The proposed Project is located on the Island of Maui, south of Pukalani of 39. The Project site has a total area of approximately 3.4 acres. The ATC will Currently under development, the Kulamalu project area encompasses a mixture of park, school, business, cultural, mutti-family residential, single-family residentlat and public/quast-public uses. The Project site is currently vacant and was recently mass-graded during site preparation for the Kulamalu Town Center and west of Kula Highway. The Project site is situated within Lots 15, 16 and 17 of the Kulamatu Town Center Subdivision (aka, Kulamatu Commercial Subdivision), and is more specifically identified as TMK: (2)2-3-08:38 and portion be situated on Lot 15 and a portion of Lot 16. The ARTC will be situated on Lot 17 and the remaining portion of Lot 16. The Kulamalu Town Center Subdivision consists of 53.67 acres and is located within the Kulamalu project area.

single-family residential subdivision) to the west. Access to the Project site from The Project site is bordered by Aapueo Parkway to the north, Ohia Ku Street to the east, undeveloped lots to the south and Lot 18 (a proposed 12-lot Kula Highway Is via Aapueo Parkway and the future Ohia Ku Street.

Figure 1 shows the location of the Project site.

Project Description

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adequately support the IFA's needs. The existing IFA Waiakoa facilities, which lacks space and state-of-the-art instrumentation to The ATC will replace the existing IFA Waiakoa Laboratory

The proposed Project consists of two (2) phases as described below.

Laboratory is presently located in Kula near the Kula Elementary School.

laboratory facilities, etc. The ATC facility will house approximately 30 employees with varying work schedules. Most of the employees will be The proposed ATC will consist of a 15,865 square foot two-story main building, a 28-stall parking lot, landscaping and related site work. The main building will include space for offices, an observation deck,

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scientists and engineers that have flexible work schedules or part of employees that will have regular work schedules will be the administrative research teams that usually start work in the afternoon. The only support staff and technicians.

Phase 2

buildings will be approximately 44,028 square feet. The Phase 2 ATRC stalls provided by the Phase 1 ATC for a total of 128 parking stalls. The annex, lecture hall and plaza. The total floor area of the Phase 2 ATRC number of additional employees and breakdown of building spaces have As currently proposed, the ATRC will consist of a main building, will provide approximately 100 parking stalls in addition to the 28 parking not been specifically defined at this time.

Figure 2 shows the proposed site plan for the Project.

Study Methodology

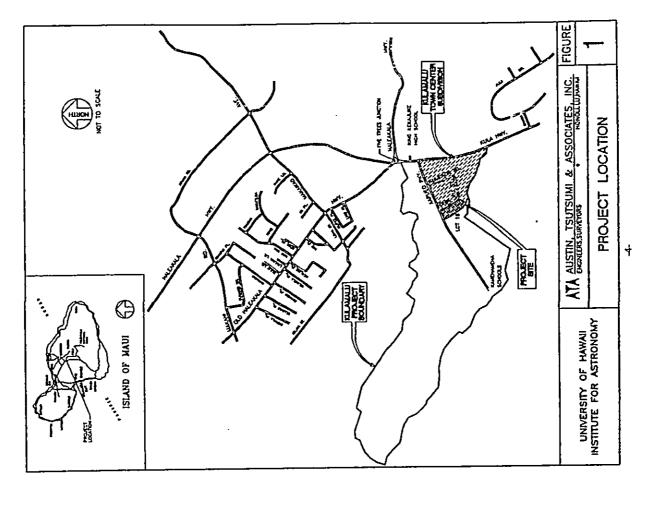
This study will address the following:

- Existing traffic operating conditions.
- Base year (build-out year of the proposed Project) traffic projections without Project-generated traffic.
- Trip generation and traffic assignment characteristics for the proposed Project.

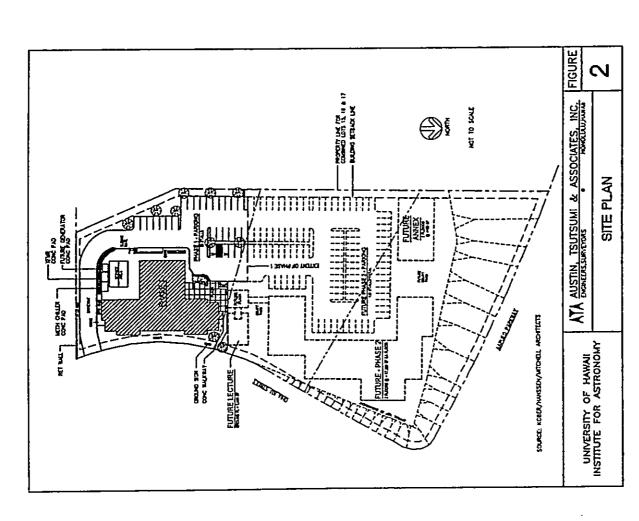
Determination of the potential Impact of Project-generated traffic on the

Recommendation of traffic mitigation measures as appropriate, to base year traffic operation. ໝ່

milgate the traffic Impacts resulting from Project-generated traffic.



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General

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Description of IFA

The IFA was founded in 1967 to manage the observatories on Haleakala and Mauna Kea. iFA observatories conduct research into galaxies, stars, planets and the Sun. Its faculty and staff are also involved in education and the development of the observatories. The IFA operates facilities on the islands of Oahu, Hawaii and Maui. Its main base is in Manoa Valley, Oahu, just north of the University of Hawaii at Manoa main campus. IFA employs over 180 people including about 45 faculty members.

Existing IFA Walakga Laboratory Operations on Mauj

The following description of operations is based on discussions with staff at the existing IFA Welakoa Laboratory facility. The IFA Welakoa Laboratory facility in Kula presently houses 20 employees and is used as a 24-hour support/base station for work at the observatories on the summit of Haleakala. There are ten (10) State-owned vehicles that are used for travel to and from the observatories on the summit of Haleakala.

The employees at the IFA Walakoa Laboratory facility have various work schedules based on their duties. Following is a description of employment characteristics at the IFA Walakoa Laboratory facility.

- There are a total of 20 employees at the IFA Waiakoa Laboratory facility.
- There are a total of six (6) administrative support staff and technicians who have regular work schedules from 6:00 AM to 5:00 PM.
- The scientists and engineers have flaxible hours and start work
 between 7:00 AM and 8:30 AM; their work schedule is largely based
 on the viewing conditions at the summit of Haleakala Crater and their
 workdays can typically exceed eight (8) hours.

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- There is usually one (1) operator at the IFA who works the night shift and leaves one (1) hour before sunitse.
- There are also three (3) two-person teams that are part of a satellite laser ranging team that usually starts work in the afternoon depending on the viewing conditions.

All of the scientists and engineers check in at the IFA Walakoa Laboratory facility to perform administrative tasks before journeying to the summit and check in before leaving at the end of the workday. The end of the workday varies for the scientists, engineers and research teams, as their workday is dependent on the viewing conditions at the Haleakala summit.

EXISTING CONDITIONS

A. Roadway System

The following Is a brief description of the existing roadway network in the vicinity of the Project:

Haleakala Highway is generally a two-lane, State highway that links Kahulul with Haleakala National Park. The roadway intersects Hana Highway in Kahulul with Haleakala National Park. The roadway intersects Hana Highway in Kahulul in the east-west direction, beginning in Kahulul, intersecting Old Haleakala Highway and Kula Highway at the Five Trees Junction and terminating at Haleakala National Park. Haleakala Highway is a three-lane facility from Hana Highway to Makawao Avenue with two lanes in the eastbound (mauka) direction and a single lane in the westbound (makai) direction. Haleakala Highway thas a posted speed limit of 45 miles per hour (mph) on the section between Makawao Avenue and the Five Trees Junction. East of the Five Trees Junction, Haleakala Highway has a posted speed limit of 30 mph except for the section fronting King Kekaulike High School, where the posted speed limit is reduced to 25 mph during the morning and afternoon peak periods of school trafific.

Kula Highway is a two-lane, rural, arterial, State highway that connects the Pukalani area with the Ulupalakua area. Kula Highway is generally oriented in the north-south direction and begins in Pukalani at the Five Trees Junction of

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Old Haleakala Highway and Haleakala Highway. (Kula Highway eventually becomes Pillanl Highway south of the study area.) In the vicinity of the Project sile, Kula Highway has a posted speed limit of 45 mph. Fronting King Kekaulike High School, the posted speed limit is reduced to 25 mph during the morning and alternoon peak hours of school traffic. Fronting Kula Elementary School, the posted speed limit is reduced to 20 mph during school hours.

QId Haleakala Highway is a two-lane, County collector road that serves the Pukalani area. Old Haleakala Highway provides a parallel route to Haleakala Highway through the town of Pukalani. Old Haleakala Highway is oriented in the north-south direction as it intersects with Haleakala Highway approximately one-half mile east of Halimaile Road and changes to an east-west roadway through Pukalani and terminates at the Five Trees Junction at Haleakala Highway and Kula Highway. Old Haleakala Highway has a posted speed limit of 35 mph.

Makani Rogd Is a two-lane, County collector road that serves Pukalani town and Makawao town. Makani Road is generally oriented in the north-south direction, originating within Pukalani at its intersection with Old Haleakala Highway, and extending northeastery to eventually intersect with Makawao Aventua

Pukalani Street is a two-lane, County collector roadway serving residential and commercial areas in Pukalani town. Pukalani Street is generally oriented in the north-south direction, originating at its intersection with Old Haleakala Highway, and extending southwesterly to the Pukalani Country Club Golf Course.

Within the study area, <u>Makawao Avenue</u> is a two-lane, County collector road that serves Pukalani town and Makawao town. Makawao Avenue is generally oriented in the north-south direction, originating within Pukalani at its intersection with Old Haleakala Highway, and extending northeasterly through Makawao town. North of its intersection with Baldwin Avenue, Makawao Avenue terminates across from Kaupakulua Road.

Loha_Street is a two-lane, County collector roadway serving residential areas in Pukalani. Loha Street is a continuation of Makawao Avenue south of its intersection with Old Haleakala Highway.

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to the public) collector roadway with a posted speed limit of 20 mph. Appueo Parkway will be eventually dedicated to the County of Maul and serves as the Aapueo Parkway - Is presently a two-lane, east-west, private (at the time of writing this report, it was signed as part of an active construction site not open only access to the Kamehameha Schools Maui Campus and the Kulamatu development.

Study Intersections ä

morning (AM) and on Wednesday. April 30, 2003 afternoon (PM) at the following Weekday peak period of traffic turning movement count surveys were conducted by Austin, Tsutsumi & Associates, Inc. on Thursday, May 1, 2003,

- Haleakala Highway/Old Haleakala Highway (Western Intersection) unsignalized
- Haleakala Highway/Makani Road unslgnalized
- Haleakala Highway/Makawao Avenue signalized
- Haleakala Highway/Kula Highway/Old Haleakala Highway (Five Trees Junction) - signalized
- Old Haleakala Highway/Pukalani Street signalized
- Old Haleakala Highway/Makawao Avenue/Loha Street signalized
- Kula Highway/King Kekaulike High School (KKHS) Driveway/ Residential Driveway - unsignalized
- Kula Highway/Aapuso Parkway unsignalized

right-turn traffic. Right-turn traffic on the Old Haleakela Highway northbound approach is yield sign-controlled and channelized by a treiflic Island. The Haleakala Highway westbound approach is striped with a single through lane, as at a modified "tee" Intersection. Old Haleakala Highway is the northbound approach at this unsignalized intersection and is controlled by a stop sign. The Old Heleakala Highway approach is striped with exclusive lanes for left-turn and At the Haleakala Highway/Old Haleakala Highway (Western Intersection). Old Haleakala Highway makes a 90-degree tum to intersect Haleakala Highway

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turn lane. Right-turn traffic from the eastbound approach is "free" as this westbound left-turns are not allowed at this intersection. The Haloakala Highway eastbound approach is striped with two (2) through lanes and an exclusive rightmovement is channelized by a traffic island.

contraflow operation, there is no conflicting traffic for the northbound to westbound left-turn movement from the Old Haleakala Highway approach. The approach onto Haleakala Highway are prohibited. As a result of the AM AM contraflow operation is discussed in more detail in the "Fie'd Observations" A contraftow operation on Haleakala Highway is implemented during the weekday AM peak period of traffic. When the contraflow operation is in effect, all traffic on the Haleekala Highway eastbound approach is forced to exit via righttum onto Old Haleakala Highway and right-furns from the Old Haleakala Highway

northbound and southbound approaches is channelized by traffic Islands and Is yield sign-controlled. The Haleakala Highway westbound approach is striped with an exclusive left-turn lane and a shared through/right-turn lane. The Haleakala Highway eastbound approach is striped with an exclusive left-turn lane, a through lane, and a shared through/right-turn lane. Right-turn traffic from turn/through lane and an exclusive right-turn lane. Right-turn traffic on the <u>Haleakala Highway/Makani Road</u> is an unsignalized "cross" intersection northbound and southbound approaches are striped with a shared left-The Makani Road the westbound and eastbound approaches is yield sign-controlled. with traffic on Makeni Road controlled by a stop sign.

The Makawao Avenue northbound and southbound approaches and the Halaakala Highway westbound approach provide exclusive lanes for left-furn traffic, through traffic and right-turn traffic. The Haleakala Highway eastbound approach is striped with an exclusive left-turn lane, two through lanes and an exclusive right-tum lane. Right-tum traffic on each approach is yield sign-Haleakala HighwayiMakawao Avenue Is a signalized "cross" Intersection. controlled and channelized by raised traffic islands.

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Highway approaches are striped with a shared left-turn/through lane and approach and Old Haleakala Highway is the eastbound approach at this approaches provide exclusive lanes for left-turn traffic, through traffic and righttum traffic. The westbound Haleakala Highway and eastbound Old Haleakala exclusive right-turn lane. Right-turn traffic on each approach is yield sign-Haleakaja Highway/Kula Highway/Old Haleakala Highway (Five Trees southbound and westbound approaches of the intersection (Haleakala Highway makes a 90 degree turn at this intersection). Kula Highway is the northbound intersection. The northbound Kula Highway and southbound Haleakala Highway Haleakala Highway is the controlled and channelized by raised traffic islands. Junction) is a signalized "cross" intersection.

lane and a through lane. The Old Haleakala Highway eastbound approach Is Haleakala Highway westbound approach is striped with an exclusive left-turn Old Haleakala Highway/Pukalani Street is a signalized "tee" intersection with Pukalani Street as the stem. The northbound Pukalani Street approach provides exclusive lanes for left-turn traffic and right-turn traffic. striped with a through lane and an exclusive right-turn lane.

turn/through/right-furn lane. The southbound Makawao Avenue approach is striped with a shared left-turn/through lane and an exclusive right-turn lane. The Old Haleakala Highway/Makawao Avenue/Loha Street is a signalized approaches provide a single lane, which is striped as a shared left-Old Haleakala Highway eastbound approach is striped with an exclusive left-turn "cross" intersection. The Loha Street northbound and Old Haleakala westbound lane and a shared through/right-turn lane.

sign-controlled. The KKHS driveway is striped with an exclusive right-turn lane turn lane. The northbound Kula Highway approach is striped with an exclusive <u>Oriveway</u> is an unsignalized "cross"-intersection. The southbound Kula Highway approach is striped with an exclusive left-furn lane and a shared through/rightright-turn lane that is yield sign-controlled and a shared left-turn/through lane. The westbound KKHS and eastbound residential driveway approaches are stop and exclusive left-turn lane. The residential driveway is striped with a single lane Kula Highway/King Kekaulike High School (KKHS) Driveway/Residential

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The southbound Kula Highway approach Is striped with an exclusive right-turn lane and a through lane. The eastbound Aapueo Parkway approach is striped Highway approach is striped with an exclusive left-tum lane and a through lane. Kula Highway/Aapueo Parkway is an unsignalized "tee"-intersection with The northbound Kula with an exclusive left-turn lane and an exclusive right-turn lane. Aapueo Parkway as the stop sign-controlled stem.

Figure 3 shows the existing traffic lane configurations at the study Intersections.

Field Observations ပ

peak hours of commuter traffic are considered in this study since the Project is peaks earlier than the PM peak hour of commuter traffic. Only the AM and PM within the same time frame as the commuter peak traffic on Kuta Highway. In the afternoon, traffic generated by KKHS and Kamehameha Schools Maui Campus not expected to generate a significant amount of traffic during the PM peak hour The weekday AM and PM peak hours of traffic were determined to occur from 7:00 AM to 8:00 AM and 3:30 PM to 4:30 PM, respectively. In the morning, the peak for traffic generated by KKHS and traffic on Aapueo Parkway (Kamehameha Schools Maui Campus and construction traffic) generally occur of school traffic. The traffic count data is provided in Appendix A.

eastbound lane is used for westbound travel on Haleakala Highway during the the Haleakala Highway/Old Haleakala Highway (Western Intersection) to the Five The State of Hawaii Department of Transportation (SDOT) implements a contrailow operation on Haleakata Highway from the Haleakata Highway/Old Haleakala Highway (Western Intersection) to the Haleakala Highway/Hana AM contrassow operation. All eastbound traffic on Haleakala Highway originating downstream of Old Haleakala Highway is diverted onto Old Haleakala Highway during the contraflow operation. Access to eastbound Haleakala Highway from Trees Junction is limited to traffic from Makani Road and Makawao Avenue only. Highway intersection during the weekday AM peak period of traffic.

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After 8:00 AM, traffic volumes tapered off quickly and the queue of northbound queue of northbound vehicles extending well past the Aapueo during the 20-minute period before the start of the KKHS school day (8:00 AM). from KKHS, northbound vehicles on Kula Highway were also observed to intersection was observed. As a result of the long queue of northbound vehicles frequently yield to southbound vehicles turning left into the KKHS the PM peak hour of commuter traffic as the KKHS school day ends at 2:00 PM. and queuing at this Intersection was much lighter during the PM peak hour of traffic. vehicles dissipated. Traffic volumes entering and exiting KKHS were much lower yield to eastbound vehicles turning left onto the highway from Aapueo This results in additional delays for northbound traffic on Kula Highway This is expected since the PM peak hour for school traffic does not coincide with it was observed that northbound through vehicles on Kuia as a long Parkway Highway driveway Parkway. frequently

ffic Operations

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Level of service (LOS) is a qualitative measure used to describe the condition of traffic flow, ranging from free-flow conditions at LOS A to congested conditions at LOS F. The <u>Highway Capacity Manuel — HCM 2000</u> methodology for calculating levels of service was used in this study. LOS definitions for unsignalized and signalized intersections are provided in Appendix B. LOS calculations are provided in Appendix C. It should be noted that overall LOS for unsignalized intersections is no longer calculated in the HCM 2000 procedure; LOS is only calculated for the stop sign-controlled (minor) approaches and for left-turn traffic from the major roadway.

The LOS analysis results for existing traffic conditions at the study intersections are described below. Table 1 summarizes the existing LOS at the study intersections. Figure 4 shows the existing traffic volumes and LOS at the study intersections during the AM and PM peak hours of traffic. The traffic volumes shown on Figure 4 include traffic associated with current construction activity for the Kamehameha Schools Maul Campus expansion that was observed at the west end of Aapueo Parkway. The LOS analysis assumes that drivers behave according to traffic controls at the intersection and does not account for delays caused by vehicles on Kula Highway yielding to vehicles

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turning into and out of the KKHS driveway and vehicles turning out of Aapueo Parkway during the AM peak hour of traffic.

Haleakele Highway/Old Heleakele Highway (Western Intersection)

hour of traffic, all individual movements at this unsignalized intersection operate at Haleakala Highway were headed westbound towards Kahului. Most of these which operates at LOS F. A review of 24-hour traffic count data collected in 2001 by SDOT indicates that traffic volumes at this intersection meet the four-hour warrant for the Installation of a traffic signal system as described in the Manual During the AM peak hour of traffic, all movements at this Intersection have no conflicting flow since eastbound traffic on Haleakala Highway (499 vehicles during the AM peak hour of traffic) is diverted onto Old Haleakala Highway because of the AM contraflow operation. During the AM peak hour of traffic, 1,173 vehicles from Haleakala Highway and 758 vehicles from Old vehicles appear to be going to work in other areas of Maui. During the PM peak LOS D or better except for northbound left-turn traffic on Old Haleakala Highway, on Uniform Traffic Control Devices - Millennium Edition (MUTCD-2000).

Haleakala Highway/Makani Road

All Individual movements at this unsignalized intersection operate at LOS D The Makani Road northbound shared left-turn/through traffic operates at LOS E during the AM peak hour of traffic and LOS F during the PM peak hour of traffic. The Makani Road southbound shared left-turn/through traffic operates at LOS F during the AM and PM peak hours of traffic. Southbound right-turn traffic volume Is high (344 vehicles) during the AM peak hour of traffic because vehicles coming from Makawao Town bypass the Makawao Avenue/Haleakala Highway intersection and instead use Makani Road to turn right onto westbound Haleakala Highway. A review of 24-hour traffic count data collected in 2001 by SDOT indicates that traffic volumes at this intersection meet the eight-hour and four-hour warrants for the installation of a traffic signal system as described in the MUTCD. 2000. Installation of a traffic signal system at this intersection is planned by SDOT operates at LOS F during the AM peak hour of traffic. The southbound right-turn or better during the AM and PM peak hours of traffic except for the following. and for the purposes of this study assumed to be operational by the Year 2005.

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Haleakala Highway/Makawao Avenue

southbound vehicles coming from Makawao Town also utilize Makani Road to observed on the Makawao Avenue southbound approach during the AM peak beyond the exclusive right-turn lane on Makawao Avenue and blocking vehicles PM peak hours of traffic. All individual movements at this intersection operate at This signalized intersection operates overall at LOS C during the AM and hour of traffic. The southbound queue averaged over ten vehicles, extending from making a right-turn to westbound Haleakala Highway. As a result, Queuing was LOS D or better during the AM and PM peak hours of traffic. lum right onto westbound Haleakela Highway.

Haleakala Highway/Kula Highway/Old Haleakala Highway (Five Trees Junction)

Highway to southbound Kula Highway. This heavy right-turn volume is in part observed to be about three to four vehicles on the westbound Haleakala Highway movements at this intersection operate at LOS D or better during the AM and PM peak hours of traffic. Traffic queues averaging eight to ten vehicles were observed on the northbound Kula Highway approach and on the westbound During the AM peak hour of traffic, 420 vehicles turned right from eastbound Old Haleakala due to the AM contraflow operation on Haleakala Highway west of the study area. During the PM peak period of traffic, the average queue length was peak hour of traffic and LOS B during the PM peak hour of traffic. All Individual This signalized intersection operates overall at LOS C during the AM Haleakala Highway approach during the AM peak period of traffic.

Old Haleakala Highway/Pukalani Street

movements at this intersection operate at LOS D or better during the AM and PM peak hours of traffic. During the AM peak hour of traffic, 551 vehicles turned left from Pukalani Street to westbound Old Haleakala Highway. Most of these vehicles appear to be headed to work in other areas of Maui via Haleakala This signalized intersection operates overall at LOS C during the AM peak hour of traffic and LOS B during the PM peak hour of traffic. All Individual

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Old Haleakala Highway/Makawao Avenue/Loha Street

PM peak hours of traffic. All individual movements at this intersection operate at LOS D or better during the AM and PM peak hours of traffic. Vehicle queues at This signalized intersection operates overall at LOS B during the AM and this intersection were minimal and able to clear with every cycle.

Kula Highway/King Kekaulike High School (KKHS) Driveway/Residential Driveway

traffic volumes at this intersection during the AM and PM peak hours of traffic do not meet the peak hour warrant for the installation of a traffic signal system as driveway approach operate at LOS F during the AM peak hour of traffic and at LOS E during the PM peak hour of traffic. However, few vehicles use the shared driveway approach, five (5) vehicles and three (3) vehicles during the AM and PM peak hours, respectively. During the AM peak hour of traffic, a total of 362 vehides entered and 143 vehides exited KKHS at this intersection. The existing All Individual movements at this unsignalized intersection operate at LOS D Westbound left-turn traffic from KKHS and eastbound traffic on the shared or better during the AM and PM peak hours of traffic except for the following. described in the MUTCD-2000.

Kula Highway/Aapueo Parkway

of a traffic signal system as described in the MUTCD-2000. A traffic signal system was also warranted under existing conditions described in the findings of the Draft Traffic Impact Analysis for Kamehameha Schools Maul Campus. A traffic signal system at this intersection is currently in the design process and for peak hours of traffic. The existing traffic volumes at this intersection during the AM and PM peak hours of traffic meet the peak hour warrant for the installation All individual movements at this unsignalized intersection operate at LOS D or better during the AM and PM peak hours of traffic except for eastbound leftturn traffic on Aapueo Parkway, which operates at LOS F during the AM and PM the purposes of this study assumed to be constructed by Year 2005.

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LOS at Study Intersections Existing Conditions Table 1

Existing

*V/c (volume to capacity ratio) > 1.0

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EB RT	EBLT	NB LT	Kula Highway/Aapueo Par	E8 LT/TH/RT	WBRT	WBLT	SBLT	NB LT/TH	Kula Highway/KKHS Drive	Overall	EB TH/RT	EBLT	WBLT/TH/RT	SBRT	SBLT///H	NB LT/TH/RT)id Haleakala Highway/Ma	Overall	EB RT	HI 83	WB TH	WBLT	NB RT	NB LT	Old Haleakala Highway/Pukalani Street		
В	Ę,	A	kway	F	C C	F	8	A	Oriveway/Residential Oriveway	8	Α	A	8	5	8	B	Old Haleakala Highway/Makawao Avenue/Loha Street	C	Α	C	8	C	Α	c	kalani Street	AM Peak Hour	Existing
B	F-9) A		E	C	E	A	A	****	В	A	A	В	C	8	В		8	Α	В	Α.	В	В	В		PM Peak Hour	ung

Table 1 (continued)
LOS at Study Intersections
Existing Conditions

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DYMYNM 1000 (a) HALEAKALA HIGHWAY HALEAKALA HIGHWAY OLD HALEAKALA HICHWAY LEGEND

| H(H) = M(M) PCAC HOUR
OF TRATTC VOLUMES
- MOUNDER! HOT POSSITED DUE TO
AN COMPANION OPDIATION LOHA STREET PUKALANI STREET - SIGNALIZED INTERSECTION THE STATE OF THE S - UNSCHALZED MILESECTION \Diamond 211(mg) (CM) (EV) 117 ** - NO CONFLICTING MONOMORS - V/c (VOLUME TO CAPACITY RATIO) > 1.0 AM PEAK HOUR 7:00 - 8:00 AM 330 - 430 PJ ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGNELISSURVEYORS HONOLULUJUMMA **FIGURE** UNIVERSITY OF HAWAII
INSTITUTE FOR ASTRONOMY 4 EXISTING TRAFFIC VOLUMES AND LEVEL OF SERVICE

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BASE YEAR TRAFFIC CONDITIONS WITHOUT PROJECT

Phase 1, the ATC, is estimated to be completed in Year 2005 and Phase 2, the ATRC, is estimated to be completed in Year 2006. Therefore, Year 2005 and Year 2006 were chosen to represent base conditions without Project-generated traffic.

percent per year, which is the approximate annual vehicular growth rate projected for the project after the Kamehameha Schools Maul Campus expansion is complete. The Kamehameha Schools Maui Campus expansion was estimated based on the number of construction workers given by the contractor. Construction trips were subtracted from existing traffic counts because they will no longer be generaled by the construction resulting volumes were increased by applying an annual vehicular growth rate of 1.3 Traffic believed to be associated with current construction activity for the major roadways in the Pukalani area based on information contained in the Maui Long. Renge Land Transportation Plan (MLRLTP), dated February 1997.

anticipated to be completed within the 2005-2006 timeframe. SDOT has indicated that hour of traffic was not adjusted since there is no contraflow operations during the PM At the time of writing this study, the widening of Haleakala Highway to four lanes from Hana Highway to Old Haleakala Highway (Western Intersection) by SDOT is once Haleakala Highway is widened, the AM contraflow operation will be discontinued during the AM peak period of traffic. Projected traffic volumes for the AM peak hour of traffic were reassigned to the roadway network assuming the discontinuation of the AM and vehicles on the Haleakala Highway eastbound approach to Old Haleakala Highway (Western Intersection) will no longer be forced to turn right onto Old Haleakala Highway contratiow operation on Haleakala Highway. Projected traffic volumes for the PM peak peak hour.

Base Year 2005 Without Project

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The following are descriptions of known new/future developments that are expected to generate significant traffic demand within the study area and anticipated to be completed by 2005. Traffic generated by these projects are included in Base Year 2005 traffic projections for this study.

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Kulamalu Development

square feet (SF) of office space and 52,250 SF of retail space) for the approximately 9.3-acres, the 12-dwelling unit single-family Kulamalu generated by these projects were estimated by applying appropriate trip type of developments will be constructed within the Kulamalu Mauka of a mix of 25 percent office and 75 percent retail by floor area (17,420 anticipated to be completed within the 2005 timeframe as part of the planned Kulamalu development. These projects include a county park of Hilltop Subdivision and the Kulamalu Mauka Subdivision which will consist of office and commercial uses. Peak hour vehicular trips generation rates in Trip Generation, 6th Edition, published by the Institute of Transportation Engineers (ITE). It is unknown at this time exactly what Subdivision. The Kulemalu Mauka Subdivision was assumed to consist At the time of writing this study, various known projects were purpose of estimating background traffic for this study.

an enrollment of about 600 students in grades K through 9 at the time the year is planned, which will expand the campus to a full enrollment of about 1,100 students in grades K through 12 by the 2005 school year. Vehicular trips generated by the expansion of the Kamehameha Schools Maui Campus during the AM peak hour of traffic were obtained from the Praft Traffic Impact Analysis for Kamehameha Schools Maui Campus by during the PM peak hour of traffic were estimated by applying trip generation rates for the peak hour of adjacent street traffic contained in ITE, Trip Generation, 6th Edition since the school peak hour of traffic is not likely to coincide with the 3:30 PM to 4:30 PM commuter peak hour of traffic count survey was conducted. Addition of one grade level every Phillip Rowell and Associates, dated June 2002. Vehicular trips generated by the expansion of the Kamehameha Schools Maul Campus the Maui campus, which is also a part of the Kutamalu development, had According to the Kamehameha Schoots Maui Campus websile, traffic on Kula Highway.

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Kula Residence Unit 1 તં

the existing number of occupied lots and existing traffic volumes entering occupied. Peak hour trips generated by the development of the remaining vacant tots in Kula Residence Unit 1 were estimated based on residential subdivision located south of the Project site off of Kula Highway in Walohuil. Owners of these lots are responsible for construction of their own homes. As of March 2003, 102 lots were in addition, the Department of Hawaiian Home Lands (DHHL) has constructed 321 jots known as Kula Residence Unit 1, a single-family and exiting the subdivision.

Kuatono Subdivision

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Kualong Subdivision by Austin, Tsutsumi and Associates, Inc., dated homes at their leisure. Vehicular trips generated by the Kualono Subdivision were obtained from the Traffic Impact Analysis Report for the Construction of the roadways and infrastructure for the Project Is anticipated to be completed by the first quarter of 2005 after which owners of the house lots can begin construction of individual single-family The Kualono Subdivision will be located off of Old Haleakala Highway just west of the Five Trees Junction, and will consist of approximately 49 single-family house lots and adjacent 9.232 acre park. December 1, 2003.

Table 2 shows the trips generated during the peak hour of traffic by the known developments near the Project that are anticipated to be completed by Year 2005 excluding Project-generated trips.

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Table 2 Base Year 2005 Peak Hour of Traffic Trips Generated by Known Developments Near the Project

	AM Paak	Bak	PM Peak	eak
	Enter	EX	Enter	Exit
County Park	6	-	2	4
(9.3 Acres)	'			
Kulamalu Hilltop Subdivision	4	4	6	9
(12 units)				١
Kulamalu Mauka Subdivision	41	9	72	50
Expansion of				
Kamehameha Schools	218	145	유 	45
Maul Campus				
(grades K-12)				
Kula Residence Unit 1	77	8	23	<u>۔</u>
(219 remaining lots)				
Kuatono Subdivision	14	**	38	24
(49 lots)	:	,	_	
Total	324	250	208	569

Base Year 2005 Traffic Operations Without Project-Generated Traffic œ

Project Indicates traffic at the study intersections will operate at LOS D or better except at the following locations. Table 3 summarizes the Base Year 2005 LOS at the study Intersections. Figure 5 shows the Base Year 2005 traffic volumes The Base Year 2005 traffic conditions without traffic generated by the IFA are described below. Analysis of Base Year 2005 traffic conditions without the and LOS at the study intersections during the AM and PM peak hours of traffic.

vehicles on Kula Highway will experience LOS F conditions in the vicinity of KKHS and Aapueo Parkway during the 20-minute period before the start of the The LOS analysis assumes that drivers behave according to traffic controls and does not account for delays caused by vehicles on Kula Highway yielding to vehicles turning into and out of the KKHS driveway and vehicles turning out of Aapueo Parkway during the AM peak hour of traffic. If drivers continue to behave inconsistently with traffic controls, northbound through KKHS school day (8:00 AM).

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Haleakala Highway/Old Haleakala Highway (Western Intersection)

According to the current roadway design from SDOT, the widening will originate as the receiving lane for northbound left-turn traffic Highway. As an unsignalized intersection, northbound left-turn traffic will additional westbound lane on Haleakala Highway provided by the from Old Haleakala Highway at its western intersection with Haleakala operate at LOS F during the AM and PM peak hours of traffic.

Haleakala Highway/Makawao Avenue

This signalized intersection will operate overall at LOS D during The southbound left-turn and eastbound left-turn traffic will operate at the AM peak hour of traffic and LOS C during the PM peak hour of traffic. LOS E during the AM peak hour of traffic.

Kula Highway/KKHS Driveway/Residential Driveway

Eastbound traffic on the shared driveway approach will operate at LOS F Westbound left-turn traffic from KKHS will operate at LOS F during the AM and PM peak hours of traffic. Westbound right-turn traffic from during the AM and PM peak hours of traffic. However, few vehicles are projected to use the shared driveway approach, ten (10) vehicles during the AM peak hour of traffic and ten (10) vehicles during the PM peak hour of traffic. The projected Base Year 2005 traffic volumes at this Intersection during the AM and PM peak hours of traffic do not meet the peak hour warrant for the installation of a traffic signal system as KKHS will operate at LOS E during the AM peak hour of traffic. described in the MUTCD-2000.

the AM peak hour of traffic and LOS A during the PM peak hour of traffic. All The installation of a traffic signal system at the Hateakala Highway! Makani Road Intersection will result in traffic operating overall at LOS D during individual movements will operate at LOS D or better.

peak hour of traffic and LOS A during the PM peak hour of traffic. All individual The Installation of a traffic signal system at the Kufa Highway/Aapueo Parkway Intersection will result in traffic operating at overall LOS B during the AM movements will operate at LOS D or better.

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LOS at Study Intersections Base Year 2005 Without Project

	Existing	ting	Base Year 2005	ar 2005
	AM Peak	РМ Реак	AM Peak	PM Peak
	Hour	Hour	Hour	Hour
Haleakala Highw	Haleakala Highway/Old Haleakala Highway (Western Intersection)	a Highway (Wesl	tem Intersection)	
NB LT			F.	ů
NB RT	:	8	4	В
Haleakala Highw	Haleakala Highway/Makani Road			
NB LT/TH	ננו	ů.	ı	
NB RT	4	В		,
HL/LT BS	Ŧ	ů	:	:
SBRT	ů.	æ	ı	
11 BM	4	4	1	:
17 83	∢	4	ı	1
Haleakala Highw	Halaakala Highway(Makani Road (signalized)	(signalized)		
NB LT/TH	1	**	ပ	O
NB RT	•	-	O	U
SBLT/TH	:	_	ပ	O
SBRT	1	-	٥	O
WBLT	:		60	4
WB TH/RT	-	-	۵	∢
EBLT	:		60	4
EB TH/RT	ŧ	1	4	4
Overall	ı	1	٥	٨

*V/c (volume to capacity ratio) > 1.0

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Table 3 (continued) LOS at Study intersections

																			_	_,				_,	_	_	_		_		_	_	-	\neg
	1	PM Peak	200		В	ပ	4	۵	8	Ą	S	۵	O	٥	8	മ	ပ	Trees Junction)	U	В	ပ	O	8	O	S	ပ		В	В	8	4	8	4	8
	Base Year	AM Peak	non		O	၁	8	ш	ပ	В	٥	D	ပ	ш	æ	В	٥	Highway (Five T	0	D	D	၁	8	Q	ပ	٥		83	¥	S	В	O	٧	В
Base Year 2005 Without Project	gr.	តេ	Hour	ı	В	ပ	٧	٥	В	٧	ပ	၁	ပ	၁	В	В	၁	Haleakala	ပ	8	ပ	В	В	S	O	8	Street	8	8	В	A	8	A	æ
Base Year	Existing	ŀ¥		у/Макаwао Ауепце	B	8	8	٥	8	8	၁	ပ	8	۵	8	8	S	ay/Kula Highwa	3	S	၁	æ	8	၁	3	၁	Highway/Pukalani	O	¥	ပ	8	၁	¥	ပ
!		1		Haleakala Highway/Makawao	NBLT	HE GN	NBRT	SBLT	SBTH	SBRT	WBLT	WB TH	WBRT	EBLT	EB TH	EB RT	Overall	Haleakala Highway/Kula Highway/Old	NBLT	NB TH	SBLT	SB TH	SBRT	WBLT/TH	EBLT/TH	Overall	쿱	NB LT	NBRT	WBLT	WBTH	EB TH	EB RT	Overall

*V/c (volume to capacity ratio) > 1.0

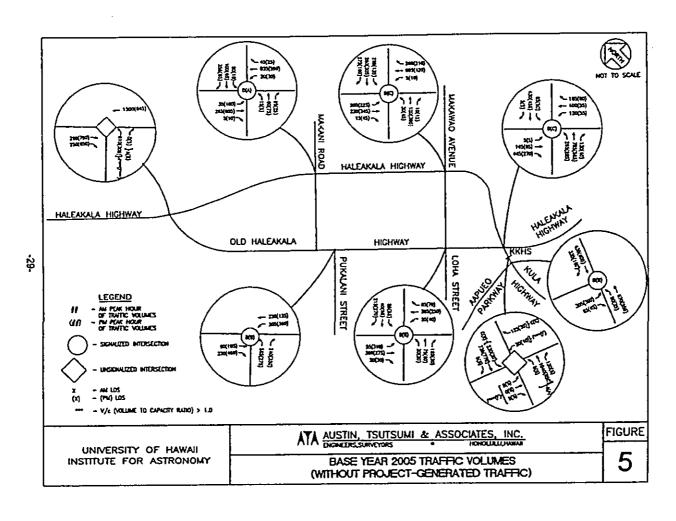
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Table 3 (continued) LOS at Study intersections Bass Year 2005 Without Project

	Existing	ina	Base Year 2005	ar 2005
<u> </u>	AM Peak	PM Peak	AM Peak	PM Pesk
_	Hour	Hour	Hour	Hour
d Haleakala Hi	Old Haleakala Highway/Makawao	Avenue/Loha	Street	
NB LT/TH/RT	8	8	ပ	8
SB LT/TH	8	8	В	В
SBRT	S	၁	C	O
WB LT/TH/RT	8	8	В	В
E8 LT	4	٧	A	4
EB TH/RT	4	4	Ą	Ą
Overall	œ	8	В	8
ula Highway/Ki	KHS Driveway/R	Kula Highway/KKHS Driveway/Residential Driveway	ay	
NB LT/TH	4	4	¥	٧
SBLT	8	4	ပ	8
WBLT	tı.	w	• d	F
WBRT	U	0	3	၁
EB LT/TH/RT	L.	E	F.	F
ula Highway/A:	Kula Highway/Aapueo Parkway			
NB LT	∢	٧	1	1
EBLT	ů.	•H	1	1
EB RT	В	8	1	'
(ula Highway/A	Kula Highway/Aapueo Parkway (Signalized)	(Signalized)		
NBLT	;	:	٧	A
NB TH	1	;	၁	В
SB TH	-	1	В	8
SBRT	:	1	٧	A
EBLT	:	:	၁	В
EBRT	1	1	၁	63
Overall	<u>'</u>	1	8	8

"V/c (volume to capacity ratio)>1.0

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Base Year 2005 Traffic Mitigation Measures

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The following traffic mitigation measures are proposed to accommod Base Year 2005 projected traffic volumes without Project-generated traffic.

Haleakala Highway/Old Haleakala Highway (Western Intersection)

Install a traffic signal system at this intersection. As mentioned earlier, a review of 24-hour traffic count data collected in 2001 indicates that traffic volumes at this intersection meet the four-hour warrant for the installation of a traffic signal system as described in the MUICD-2000. Interconnect and synchronize this traffic signal system with the planned traffic signal system at the Haleakala Highway/Makeni Road intersection, and existing traffic signal systems along Haleakala Highway at Makewao Avenue and the Five Trees Junction. Table 4 summarizes the Base Year 2005 LOS analysis at the Haleakala Highway/Old Haleakala Highway (Westem Intersection) with the Installation of a traffic signal system. The intersection will operate overall at LOS F during the AM peak hour of traffic and LOS B during the PM peak hour of traffic. All individual movements will operate at LOS D or better except for northbound left-turn and westbound through traffic, which will operate at LOS F during the AM peak hour of traffic.

The results shown in Table 4 assume a traffic signal system phasing such that the signal will stop all the westbound through traffic on Haleakala Highway (I.e. creating a separate phase for each approach). The widening of Haleakala Highway form Hana Highway to the Old Haleakala Highway (I.e. creating a separate phase for each approach). The widening of Haleakala Highway (Western Intersection) will provide an additional westbound through lane. Haleakala Highway east of Old Haleakala Highway. The northbound teffic on Old Haleakala Highway. The northbound teffic on Old Haleakala Highway. The northbound teffic on Old Haleakala Highway would have a dedicated lane west of the intersection. In this case, the westbound through vehicles would not be controlled by the traffic signal system and would be allowed to proceed continuously. This

alternate signal phasing would result in the intersection operating overall at LOS A during the AM and PM peak hours of traffic with all individual movements operating at LOS D or better.

Table 4 LOS with Traffic Mitigative Measures Base Year 2005

	Base Year 2005	ar 2005	Base Year 2005 With Mitgative Measures	ar 2005 e Measures
_	AM Peak	PM Peak	AM Peak	PM Peak
Haleakala Highway/Old Haleakala Highway (Western Intersection)	y/Old Haleakela	Highway (West	em Intersection	(c
NB LT	.±	F.	-	ı
WB TH	¥	В	t	:
Hateakala Highway/Old Haleakala Highway (Western Intersection, signalized)	y/Old Haleakala	Highway (Wes	tem Intersection	n, signalized)
NB LT		•	Ŀ	U
WB TH	1		ţ.	B
EB TH	:	1	В	4
Overall	t	;	ů.	B

"V/c (volume to capacity ratio)>1.0

Base Year 2006 Without Project

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The following are descriptions of new/future known developments that are expected to generate significant traffic demand within the study area and anticipated to be completed in Year 2006. Traffic generated by these projects, in addition to traffic generated by the known developments anticipated to be completed by Year 2005, is included in Base Year 2006 traffic projections for this study.

Kulamalu Development

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The Kulamalu Assisted Living/Skilled Nursing Facility, with 102 beds, and the Kulamalu Adult Day Care Center, which is estimated to have approximately 70 clients, are anticipated to be completed in 2006 as part of the Kulamalu development. Also, Phase 3 of the Kulamalu

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: : _! commercial Subdivision is anticipated to be completed in 2006 and will consist of office and commercial uses. Peak hour vehicular trips generated by these projects were estimated by applying appropriate trip generation reles in ITE <u>Trip Generation, 8th Edition</u>. It is unknown at this time exactly what type of developments will be constructed within Phase 3 of the Kulamalu Commercial Subdivision. Phase 3 of the Kulamalu Commercial Subdivision was assumed to consist of a mix of 25 percent office and 75 percent retail by floor area (44,260 SF of office space and 132,780 SF of retail space) for the purpose of estimating background traffic for this study.

2. Upcountry Town Center

Maul Land and Pineapple Company has proposed to develop the Upcountry Town Center, which will consist of a mix of retail, office, industrial and residential uses, on the triangular parcel of land bordered by Haleakela Highway, Old Haleakela Highway and Makawao Avenue. The Upcountry Town Center is currently anticipated to be completed in Year 2006 based on available Information. Peak hour trips generated by the Upcountry Town Center were obtained from the Traffic Impact Assessment for the Upcountry Town Center by Parsons Brinckerhoff Quade & Douglas, dated March 2002.

Table 5 shows the trips generated during the peak hour of traffic by the known developments near the Project that are anticipated to be completed by Year 2008 excluding Project-generated trips. Note that Table 5 includes the known developments that are accounted for in Base Year 2005.

Table 5 Base Year 2006 Peak Hour of Traffic Trips Generated by the Known Developments Near the Project

	AM Peak	eak	PM Peak	eak
	Enter	Exit	Enter	Exit
County Park (9.3 Acres)	3	1	2	4
Kulamalu Hillop Subdivision (12 unils)	4	14	10	9
Kulamalu Mauka Subdivision	41	9	7.5	159
Expansion of Kamehameha Schools Maui Campus (Grades K-12)	218	145	96	45
Kulamalu Skilled Nursing Facility (102 beds)	11	9	80	- 12
Kulamalu Adult Day Care (70 clients)	82	75	75	82
Phase 3 of the Kulamalu Commercial Subdivision	86	12	170	303
Kula Residence Unit 1 (219 remaining lots)	44	20	83	31
Kualono Subdivision (49 lots)	14	34	38	24
Upcountry Town Center	268	91	377	552
Total	771	434	838	1218

Base Year 2006 Traffic Operations Without Project-Generated Traffic

does not account for delays caused by vehicles on Kula Highway yielding to vehicles turning into and out of the KKHS driveway and vehicles turning out of Aapueo Parkway during the AM peak hour of traffic. If drivers continue to are described below. Analysis of Base Year 2008 traffic conditions without the Project indicates traffic at the study intersections will operate at LOS D or batter except at the following locations. Table 6 summarizes the Base Year 2006 LOS The LOS analysis assumes that drivers behave according to traffic controls and behave inconsistently with traffic controls, northbound through vehicles on Kula The Base Year 2006 traffic conditions without traffic generated by the IFA at the study intersections. Figure 6 shows the Base Year 2008 traffic volumes and LOS at the study intersections during the AM and PM peak hours of traffic.

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Parkway during the 20-minute period before the start of the KKHS school day Highway will experience LOS F conditions in the vicinity of KKHS and Aapueo (8:00 AM).

Haleakala Highway/Old Haleakala Highway (Western Intersection)

With the installation of a traffic signal system, this intersection will operate overall at LOS F during the AM peak hour of traffic and LOS C during the PM peak hour of traffic. The northbound left-turn and westbound through traffic will operate at LOS F during the AM peak hour

traffic on Old Halaakala Highway (I.e. creating a separate phase for each approach). The widening of Haleakala Highway from Hana Highway to the Old Haleakala Highway/Haleakala Highway (Western Intersection) will provide an additional westbound through lane. Haleakala Highway east of Old Haleakala Highway/Haleakala Highway (Western Intersection) as a eastbound traffic on Haleakala Highway and northbound traffic on Old Haleakala Highway. The northbound left-turn from Old Haleakala Highway would have a dedicated lane west of the intersection. In this case, the westbound through vehicles would not be controlled by the traffic signal system and would be allowed to proceed continuously. This alternate signal phasing would result in the intersection operating overall at LOS B during the AM and PM peak hours of traffic with all individual The results shown in Table 6 assume a traffic signal system Halaakala Highway and assign the right-of-way to the northbound left-tum single lane feed would allow the traffic signal system to only stop phasing such that the signal will stop all the wastbound through traffic on movements operating at LOS D or better.

Haleakala Highway/Makani Road

With the installation of a traffic signal system, this intersection will operate overall at LOS D during the AM peak hour of traffic and LOS B during the PM peak hour of traffic. The southbound right-turn will operate at LOS E during the AM peak hour of traffic.

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Haleakala Hichway/Makewao Avenue

This signalized Intersection will operate overall at LOS E during the AM peak hour of traffic, and LOS F during the PM peak hour of traffic. Northbound through traffic will operate at LOS E during the PM peak hour of traffic. Southbound through traffic will operate at LOS E during the AM peak hour of traffic. The southbound left-turn, westbound left-turn, and eastbound left-turn will operate at LOS F during the AM and PM peak hours of traffic. Westbound through traffic will operate at LOS E during the AM and PM peak hours of traffic.

Haleakala Highwayifkula HighwayiOld Haleakala Highway (Fiye Trees

This signalized intersection will operate overall at LOS D during the AM and PM peak hours of traffic. The northbound left-turn will operate at LOS E during the AM and PM peak hours of traffic. The southbound left-turn will operate at LOS E during the PM peak hour of traffic in the westbound shared left-turn/through lane will operate at LOS E during the AM peak hour of traffic.

Kula Highway/KKHS Driveway/Residential Driveway

Westbound left-tum traffic from KKHS will operate at LOS F during the AM and PM peak hours of traffic. Westbound right-turn traffic from KKHS will operate at LOS E during the AM peak hour of traffic. Eastbound traffic on the shared driveway approach will operate at LOS F during the AM and PM peak hours of traffic. However, few vehicles are projected to use the shared driveway approach, ten (10) vehicles during the AM peak hour of traffic and ten (10) vehicles during the PM peak hour of traffic. The projected Base Year 2006 traffic volumes at this lintersection during the AM and PM peak hours of traffic do not meet the peak hour warrant for the installation of a traffic signal system as described in the MUTCD-2000.

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Kula Highway/Aapueo Parkway

With the installation of a traffic signal system, this Intersection will operate overall at LOS C during the AM and PM peak hours of traffic. The northbound left-turn will operate at LOS E during the PM peak hour of traffic.

Table 6 LOS at Study Intersections Base Year 2006 Without Project

	Existing	ting	Base Year 2006	ar 2006
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Haleakala Highw	ray/Old Haleakalı	Haleakala Highway/Old Haleakala Highway (Westem Intersection)	em Intersection)	
NB LT	1	£	•	1
NB RT	ı	8	•	1
Haleakala Highy	vay/Old Haleakal	Haleakala Highway/Old Haleakala Highway (Western Intersection, Signalized)	tem Intersection	, Signalized)
NBLT	:	1	F	U
WB TH		•	F	U
EB TH	ı	-	8	83
Overall	:	ı	ŗ.	O
Haleakala High	Haleakala Highway/Makanl Road	q		
NB LT/TH	ш	F•	ì	ı
NB RT	4	8	1	:
SB LT/TH	ů.	ů.		1
SBRT	ů.	8	•	1
WBLT	A	٧	;	1
BUT	٧	٧	1	1
*V/c (volume to	*V/c (volume to capacity ratio) > 1.0	1.0		

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Table 6 (continued)
LOS at Study Intersections
Base Year 2005 Without Project

	Base Ye	Base Year 2006 Without Project	Project	
	·益	Existing	Base Ye	Base Year 2006
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Haleakala Highway/ Makani Road (signalized)	ay/ Makani Roa	d (signalized)		
NB LT/TH	ı	,	ပ	ပ
NB RT			၁	၁
SBLT/TH	ı	-	၁	၁
SBRT	,	;	IJ	၁
WBLT	:	1	٧	4
WB TH/RT	:		a	В
EB LT	1	_	В	ပ
EB TH/RT	,		٧	A
Overall	ı	1	۵	8
Haleakala Highway/Makawao Avenue	иву/Макамао А	wenue		
NB LT	В	8	D	٥
NB TH	m	၁	٥	Е
NB RT	м	٧	q	၁
SBLT	۵	0	4	ŗ
SB TH	8	В	ш	٥
SBRT	8	٧	ပ	၁
WBLT	O	၁	ų.	Ŀ
WBTH	ပ	၁	П	В
WBRT	m	၁	۵	٥
EBLT	٥	ວ	ıL	F
EB TH	8	В	υ	ပ
EB RT	8	8	၁	၁
Overall	٥	o	ㅂ	Ŀ
2, 4, milion / 2,14	Copposite mile)	210		

*V/c (volume to capacity ratio) > 1.0

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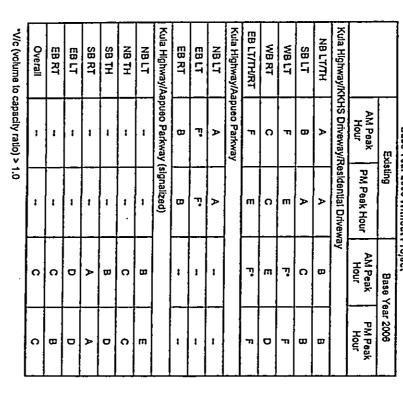
Table 6 (continued) LOS at Study Intersections Base Year 2006 Without Project

	ă	Existing	Base Ye	Base Year 2006
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
la Highw	ay/Kula Highw	Haleakala Highway/Kula Highway/Old Haleakala Highway (Five		Trees Junction)
NBLT	ပ	၁	Э	w
NB TH	U	В	٥	В
SBLT	ပ	၁	٥	ш
SB TH	æ	8	a	٥
SBRT		В	3	æ
WB LT/TH	U	2	Е	۵
EB LT/TH	U	O	υ	Q
Overall	U	8	٥	a
ileakala Hi	Old Haleakala Highway/Pukalani Street	ni Street		
NB LT	O	8	၁	၁
NB RT	4	B	A	ပ
WBLT	U	В	၁	O
WB TH	8	٧	8	٨
EBTH	ပ	В	၁	В
EB RT	4	4	4	A
Overall	ပ	æ	8	၁
aleakala H	lghway/Makav	Old Haleakala Highway/Makawao Avenue/Loha Street	Street	
NB LT/TH/RT	8	8	ပ	8
SB LT/TH	m	8	83	8
SB RT	O	O	၁	0
WBLT/TH/RT	മ	8	၁	ပ
EBLT	٧	٧	¥	4
EB TH/RT	∢	٧	¥	¥
Overall	æ	В	В	υ

*V/c (volume to capacity ratio) > 1.0

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) 117 288 MAXAWAO AVENUE MAKANI ROAD HALEAKALA HICHWAY HALEAKALA HICHWAY HIGHWAY ģ PUKALANI STREET LOHA STREET FULL HO PECHE ricina, LEGEND OF TRAFFIC VOLUMES

- PH PEAK HOUR

OF TRAFFIC VOLUMES SOMEON MIDISECTION ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. **FIGURE** UNIVERSITY OF HAWAII BASE YEAR 2006 TRAFFIC VOLUMES INSTITUTE FOR ASTRONOMY 6 (WITHOUT PROJECT-GENERATED TRAFFIC)

Table 6 (continued)
LOS at Study Intersections
Base Year 2006 Without Project

. Base Year 2006 Traffic Miligation Measures

The following traffic miligation measures are proposed to accommodate Base Year 2006 projected traffic volumes <u>without</u> Project-generated traffic. Table 7 summarizes the Base Year 2006 LOS analysis with traffic miligation measures for the affected intersections.

Haleakala Highway

lanes narrow to one (1) lane just west of the Five Trees Junction. With during the AM peak hour of traffic and LOS B during the PM peak hour of Highway (Western Intersection) will operate at LOS D or better except for during the AM peak hour of traffic and LOS A during the PM peak hour of planned widening by SDOT, Haleakala Highway would provide four (4) lanes from Hana Highway to west of the Five Trees Junction. An additional westbound lane could be provided to begin at approximately the same location where currently two (2) Haleakala Highway eastbound widening of Haleakala Highway as described, the Haleakala Highway/Old Haleakala Highway (Western Intersection) will operale overall at LOS E traffic. All individual movements at the Haleakala Highway/Old Haleakala the northbound left-turn and westbound through traffic, which will operate at LOS E and LOS F, respectively during the AM peak hour of traffic. The Haleakala Highway/Makanl Road Intersection will operate overall at LOS C direction, from the Haleakala Highway/Old Haleakala Highway (Western Intersection) to west of the Five Trees Junction. Together with the Widen Haleakala Highway to four (4) lanes, two (2) lanes in each traffic with all individual movements operating at LOS D or better.

The results shown in Table 7 assume a traffic signal system phasing such that the signal will stop all the westbound through traffic on Haleakala Highway and assign the right-of-way to the northbound left-turn traffic on Old Haleakala Highway (i.e. creating a separate phase for each approach). It may be possible to allow these movements to proceed through the intersection simultaneously if an acceleration lane is provided to receive the northbound left-turning vehicles. In this case, vehicles turning left from northbound Old Haleakala Highway onto westbound Haleakala Highway would merge with traffic on Haleakala Highway

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further west of the intersection. The westbound through vehicles would not be controlled by the traffic signal system and would be allowed to proceed continuously. This alternate signal phasing would result in the Haleakala Highway (Western Intersection) operating overall at LOS A during the AM and PM peak hours of traffic with all individual movements operating at LOS D or better. The merging of vehicles turning left onto Haleakala Highway with wastbound through vehicles on Haleakala Highway will operate at LOS C during the AM peak hour of traffic and LOS B during the PM peak hour of traffic.

Haleakala Highway/Makawao Avenue

Modify the traffic signal system at the Haleakala Highway/ Nakawao Avenue intersection to provide a protected left-turn phase to serve left-turns from Makawao Avenue. Due to the high volume of northbound through vehicles (555 vehicles) during the PM peak hour of traffic, a protected left-turn phase would be beneficial for traffic on the Makawao Avenue approaches. With a protected left-turn phase for the minor street approaches and proposed widening of Haleakala Highway as previously described, the intersection will operate overall at LOS C during the AM peak hour of traffic and LOS D during the PM peak hour of traffic. All individual movements will operate at LOS D or better except for the northbound, southbound through traffic, which will operate at LOS E during the PM peak hour of traffic.

Halaakala Highway/Kula Highway/Old Halaakala Highway (Five Treas

Adjust the traffic signal system timing at the Five Trees Junction intersection to be coordinated with the modified traffic signal at the Heleakala Highway/Makawao Avenue intersection. Due to the high volume of northbound through vehicles (555 vehicles) during the PM peak hour of traffic, a protected left-lum phase would be beneficial for traffic on the Makawao Avenue approaches. LOS analysis indicates that with adjustment of the traffic signal timing, traffic at the Five Trees Junction will operate similar to Base Year 2006 conditions.

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Table 7 LOS with Traffic Mitigalive Measures Base Year 2006

	Base Year 2006 With mitigative measures	PM Peak	n, signalized)	8	8	В	В		၁	ပ	υ	S	A	A	A	¥	A		ដា	Е	В	Е	ပ	В	Е	ш	a	ш	٥	ပ	,
	Base Y With mitigal	AM Peak	tern Intersectiv	ញ	F	၁	ш		æ	æ	8	၁	8	O.	8	8	O		G	a	ပ	٥	ວ	В	٥	٥	В	٥	ပ	8	_
Dasa rear 2000	r 2006	PM Peak	Highway (Wes	၁	O	8	၁	(signalized)	ပ	O	ပ	S	Ą	В	C	A	8		a	Е	၁	ŗ	۵	0	ш	ம	٥	4	O	၁	
Ö	Base Year 2006	AM Peak	/Old Haleakala	i.	i.	8	Ŀ		o	U	υ	ш	¥	Q	В	٧	٥	//Makawao Avenue	О	٥	٥	ц	ш	ပ	ш	Ш	O	u.	U	၁	
		L	Haleakala Highway/Old Haleakala Highway (Western Intersection,	NBLT	WBTH	EBTH	Overall	Haleakala Highway/Makani Road	NB LT/TH	NBRT	SBLT/TH	SBRT	WBLT	WB TH/RT	EBLT	EB THURT	Overall	Haleakala Highway/Makawao	NB LT	HT 8N	NB RT	SBLT	SB TH	SBRT	WBLT	WB TH	WB RT	EBLT	EB TH	EBRT	

"V/c (volume to capacity ratio) > 1.0

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FUTURE TRAFFIC CONDITIONS WITH PROJECT ≥:

Trip Generation ď

Phase 1

center rather than a 8:00 AM to 5:00 PM work facility, traffic generated by the Although Trip Generation, 6th Edition contains trip rates for a 'Research Phase 1 ATC was estimated based on current operations at the IFA Walakoa and Development Center, it is described as an 8:00 AM to 5:00 PM work facility. Since the IFA Walakoa Laboratory functions more as a base station/support Laboratory facility.

existing IFA Walakoa Laboratory facility operations based on discussions with IFA staff. The Phase 1 ATC will house approximately 30 employees, thus, the current operation with 20 employees was assumed to increase proportionally by personnel positions are not known at this time. Table 8 shows the projected Phase 1 development will be primarily a relocation and expansion of the 50 percent to represent this expansion as the exact breakdown of the additional increases in personnel and State-owned vehicles.

in the traffic analysis. In reality, all of the flex-time staff and the afternoon hours. Table 9 shows the trip generation estimate for Phase 1, which is based generation estimate for purpose of evaluating a reasonable worst-case scenario peak hours of traffic since the start and end of the workdays are influenced by viewing conditions at the summit which may result in workdays exceeding eight The trip generation estimate is based on the following travel characteristics. These projections were made to provide a conservative trip research staff may enter and exit at times outside of the AM and PM commuter on the following.

AM Peak Hour of Traffic

- All of the 8:00 AM to 5:00 PM staff enters during the AM peak hour of
- All of the flex-time staff enters during the AM peak hour of traffic.
- Ten (10) vehicles travel to the summit during the AM peak hour of traffic as a result of the flex-time staff.

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PM Peak Hour of Traffic

- All of the 8:00 AM to 5:00 PM staff leaves after 5:00 PM and are not included in the PM peak hour projections.
- All of the afternoon staff enters during the PM peak hour of traffic.
- Five (5) vehicles travel to the summit during the PM peak hour of traffic as a result of the afternoon research staff.
- Half of the vehicles (five (5)) return from the summit for the flex-time staff; this flex time staff (five (5) persons) then leaves for home during the PM peak hour of traffic.

Table 8 Projected Operations for Phase 1

	20-Employee Operation	30-Employee Operation
Vehicles	10	15
8:00 AM - 5:00 PM staff	9	6
Afternoon Research Staff	9	6
Flex-Time Staff	8	12

Table 9 Peak Hour Trip Generation for Phase 1

,	AM Pe	AM Peak Hour of Traffic	PM Pe	PM Peak Hour of Traffic
	Enter	Exil	Enter	Exi
8:00 AM - 5:00 PM Staff	თ	o	0	0
Afternoon Research Staff	o	0	6	ro.
Flex-Time Staff	12	10	S.	ß
Total	21	10	4.	5

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Traffic generated by the 44,028 gross square footage of the Phase 2 ATRC buildings was estimated by applying trip generation trip rates and equations for a The exact breakdown of the Phase 2 staff and/or building spaces have not been research and development center as described in Trip Generation, 6th Edition. specifically defined at the time of this report.

Table 10 shows the trip rates used and Table 11 shows the peak hour trips generated by Phase 2. Table 12 summarizes the total trips generated for the Project.

Trip Generation Equations and Rates for Phase 2

Daily Trip Rate
11.82

Table 11 Peak Hour Trip Generation for Phase 2

affic	ž	22
PM Peak Hour of Traffic (vph)	Enter	5
eak Traffic h)	EXI	11
AM Peak Hour of Traffic (vph)	Enter	55
Average Weekday (vpd)		520
		Research and Development Center

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Table 12
Peak Hour Trip Generation for Phase 1 and Phase 2

	AM Peak H	AM Peak Hour of Traffic (vph)	PM Peak Hou	PM Peak Hour of Traffic (vph)
	Enter	Exit	Enter	Ext
Phase I (ATC)	21	10	14	01
Phase II (ATRC)	55	11	10	57
Total	76	21	24	67

Project and Roadway Access

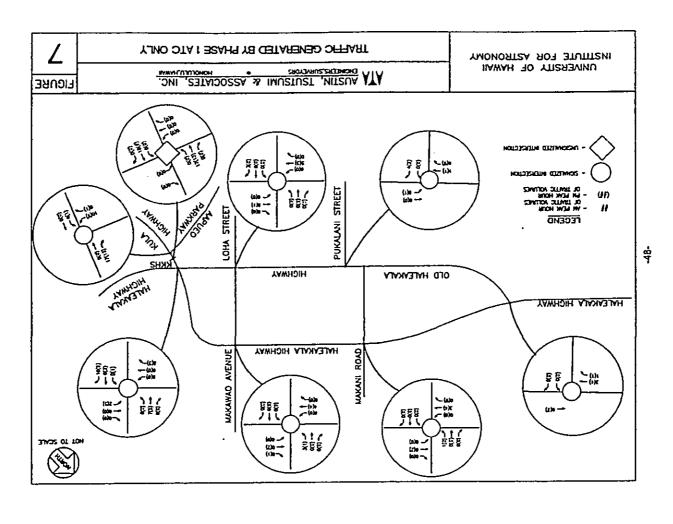
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access to the Project. Ohla Ku Street will intersect Aapueo Parkway forming an unsignalized "Tee"-Intersection. The Ohia Ku Street approach will be the stop A single driveway on the future Ohia Ku Street will provide vehicular sign-controlled stem at this intersection.

Traffic Distribution and Assignment

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and five (5) vehicles exiting during the PM peak hour of traffic) were assigned to intersection. Existing traffic patterns were used to distribute ATC and ATRC peak hour of traffic, five (5) vehicles entering during the PM peak hour of traffic, the route using the Haleakala Highway/Kula Highway/Old Haleakala Highway home-based work trips. Figure 7 shows the traffic assignment for Phase 1 and Trips to and from the summit (ten (10) vehicles exiting during the AM Figure 8 shows the total traffic assignment for the Project.



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CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

Table 12
Peak Hour Trip Generalion for Phase 1 and Phase 2

	AM Peak I	AM Peak Hour of Traffic (vph)	PM Peak Hou	PM Peak Hour of Traffic (vph)
	Enter	Exit	Enter	Exit
Phase I (ATC)	21	10	14	10
Phase II (ATRC)	55	11	10	57
Total	76	21	24	67

Project and Roadway Access

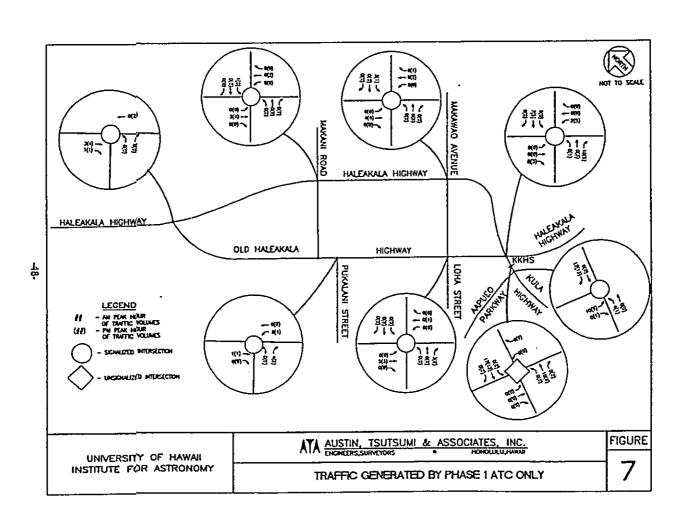
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A single driveway on the future Ohia Ku Street will provide vehicular access to the Project. Ohia Ku Street will intersect Appueo Parkway forming an unsignalized "Tee*intersection. The Ohia Ku Street approach will be the stop sign-controlled stem at this intersection.

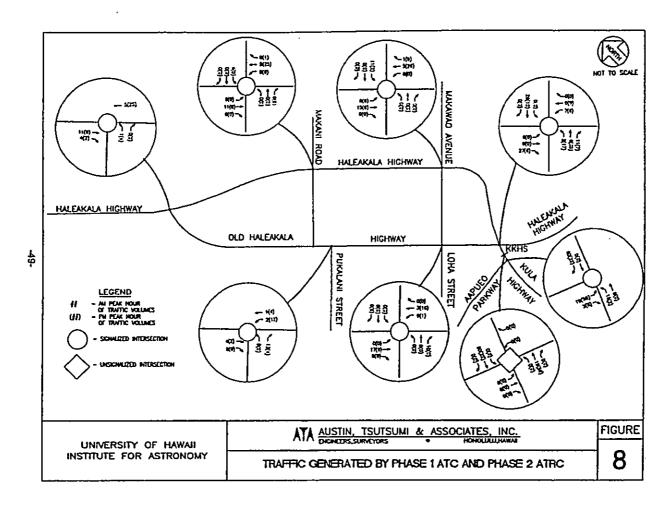
Traffic Distribution and Assignment

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Trips to and from the summit (ten (10) vehicles exiting during the AM peak hour of traffic, five (5) vehicles entering during the PM peak hour of traffic, and five (5) vehicles exiting during the PM peak hour of traffic) were assigned to the route using the Haleakala Highway/Kula Highway/Old Haleakala Highway intersection. Existing traffic patterns were used to distribute ATC and ATRC home-based work trips. Figure 7 shows the traffic assignment for Phase 1 and Figure 8 shows the total traffic assignment for the Project.



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TRAFFIC ANALYSIS WITH PROJECT

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Year 2005 with Phase 1

1 at the study intersections during the AM and PM peak hours of traffic. As previously discussed, the LOS analysis assumes that drivers behave according of Year 2005 traffic conditions with the Project indicates that traffic will Highway/Makani Road and Kula Highway/Aapueo Parkway intersections, traffic systems at the Haleakela Highway/Old Haleakala Highway, Haleakela traffic volumes to estimate Year 2005 traffic volumes with the Project drivers continue to behave inconsistently with traffic controls, northbound through vehicles on Kula Highway will experience LOS F conditions in the vicinity of KKHS and Aapueo Parkway during the 20-minute period before the start of the vehicles turning out of Aapueo Parkway during the AM peak hour of traffic. If to traffic controls and does not account for delays caused by vehicles on Kula Highway yielding to vehicles turning into and out of the KKHS driveway and intersections. Figure 9 shows the Year 2008 traffic volumes and LOS with Phase locations. Table 13 summarizes the Year 2006 LOS with Phase 1 at the study at the study intersections will operate at LOS D or better except at the similar to Base Year 2005 conditions. With the installation of traffic signal KKHS school day (8:00 AM). Traffic generated by Phase 1 of the Project was added to Base Yo following ear 2005 Analysis operate

Haleakala Highway/Old Haleakala Highway (Western Intersection

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With the installation of a traffic signal system, the intersection will operate overall at LOS F during the AM peak hour of traffic and LOS B during the PM peak hour of traffic. Northbound left-turn and westbound through traffic which will operate at LOS F during the AM peak hour of traffic.

The results shown in Table 13 assume a traffic signal system phasing such that signal will stop all the westbound through traffic on Haleakala Highway and assign the right-of-way to the northbound left-turn traffic on Old Haleakala Highway (i.e. creating a separate phase for each approach). The widening of Haleakala Highway from Hana Highway to the Old Haleakala Highway/Haleakala Highway (Western Intersection) will

Haleakala Highway. The northbound left-tum from Old Haleakala Highway would have a dedicated lane west of the Intersection. Using this atternate signal phasing will result in the Intersection operating overall at LOS A during the AM and PM peak hours of traffic with all individual of Old Haleakala Highway/Haleakala Highway (Western Intersection) as a single lane feed would allow the traffic signal system to only stop provide an additional westbound through lane. Haleakala Highway east eastbound traffic on Haleakala Highway and northbound traffic on Old movements operating at LOS D or better.

Haleakala Highway/Makawao Ayenye

The southbound left-turn and eastbound left-turn will operate at LOS E This signalized intersection will operate overall at LOS D during the AM peak hour of traffic and LOS C during the PM peak hour of traffic. during the AM peak hour of traffic.

Kula Highway/KKHS Driveway/Residential Oriveway

Eastbound traffic on the shared driveway approach will operate at LOS F The westbound left-turn from KKHS will operate at LOS F during projected to use the shared driveway approach, ten (10) vehicles during of traffic. The projected Year 2005 with Phase 1 traffic volumes at this peak hour warrant for the installation of a traffic signal system as the AM and PM peak hours of traffic. The westbound right-turn from KKHS will operate at LOS E during the AM peak hour of traffic. during the AM and PM peak hours of traffic. However, few vehicles are the AM peak hour of traffic and ten (10) vehicles during the PM peak hour Intersection during the AM and PM peak hours of traffic do not meet the described in the MUTCD-2000.

Table 13 LOS at Study Intersections Year 2005 With Phase 1

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	Exts	Existing	Base Year Mitigative	Base Year 2005 with Mitigative Measures	Year 2005 v Phase 1	Year 2005 with Phase 1
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Haleakela Highway/Old Haleakala Highway (Western Intersection)	ay/Old Halo:	skala Highw	ay (Western	Intersection	٩	
NB LT	1	ட	1	ı	1	ŧ
NB RT	1	60	,	;		
Haleakala Highway/Old Haleakala Highway (Western Intersection,	ay/Old Hale	akala Highw	ay (Western	Intersection	, signalized)	
NBLT	-	:	i.	o	ů.	O
WBTH	-	;	Ŀ	8	ů.	60
EB TH		1	8	٧	В	4
Overall	-	:	Ŀ	В	ů	6
Haleakala Highway/Makani Road	ay/Makani R	oad				
NB LT/TH	ш	i.	Ŀ	[,	
NBRT	A	8				
SB LT/TH	ů.	Ŀ	,	,		,
SBRT	ů.	B	ι	'	'	ı
WBLT	4	4	:	ı	1	,
EBLT	٧	V		,	,	,
Haleakala Highway/Makani Road (signalized)	ay/Makani F	toad (signal	(pez			
NB LT/TH	-		U	٥	O	ပ
NBRT	:		ပ	ပ	ပ	ပ
SB LT/TH	-	2	O	ပ	ပ	ပ
SBRT	:	:	٥	ပ	٥	ပ
WBLT	:		60	4	83	4
WB TH/RT	1	,	۵	4	٥	4
EBLT	;	;	В	٨	a	8
EB TH/RT	1	1	٧	٧	ß	٧
Overall	ı	:	٥	4	۵	Ф

*V/c (volume to capacity ratio) > 1.0

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Table 13 (continued)
LOS at Study intersections
Year 2005 with Phase 1

	· · · · ·	т	г		_	_		1	_		_	-			_	_	г		_	<u> </u>		_	_	r			Ι.		_	<u> </u>	_	_
Year 2005 with Phase 1	PM Peak Hour		8	ပ	∢	۵	6	∢	ပ	۵	ပ	٥	8	6	o	(uo	O	8	ပ	ပ	60	O	ပ	O		8	60	В	4	8	٧	<u>_</u>
Year 20 Pha	AM Peak Hour		O	ပ	8	1	O	8	۵	٥	ပ	핍	<u></u>	6	٥	Trees Junction	۵	٥	a	၁	8	۵	ပ	٥		80	Ą	၁	60	ပ	4	60
2005 with	PM Peak Hour		В	၁	٧	٥	В	٧	၁	٥	၁	٥	8	m	ပ	Highway (Five 1	၁	8	ပ	ပ	В	၁	၁	၁		В	В	В	٧	В	٧	æ
Base Year 2005 with Mitigative Measures	AM Peak Hour		ပ	၁	В	Е	၁	В	0	٥	၁	Ξ.	В	8	D	Haleakala Higt	Q	٥	٥	၁	8	۵	ပ	٥		8	Α	၁	В	3	A	8
jing	PM Peak Hour	Æ	8	၁	A	٥	В	٧	၁	၁	၁	၁	8	В	၁	Highway/Old Ha	၁	В	၁	Ð	8	ပ	ပ	8	lani Street	83	В	8	٧	8	A	8
Existing	AM Peak Hour	y/Makawao	В	8	В	٥	В	8	ົວ	၁	В	O	В	B	ပ		C	C	၁	В	В	၁	C	0	Highway/Pukalani	၁	٧	၁	8	၁	4	3
		Haleakala Highway/Makawao	NBLT	NB TH	NB RT	SBLT	SB TH	SBRT	WBLT	WBTH	WBRT	EB LT	EB TH	EBRT	Overall	Haleakala Highway/Kula	NBLT	NB TH	SBLT	SB TH	SBRT	WB LT/TH	EB LT/TH	Overall	akala	NBLT	NB RT	WBLT	WB TH	EB TH	EB RT	Overall

*V/c (volume to capacity ratio) > 1.0

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Table 13 (continued)

LOS at Study Intersections

Year 2005 with Phase 1

Existing Base Year 2005 with Year 2005 with

	Exis	Existing	Mitigative Measures	Measures	Phase 1	se 1
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak
Old Haleakala Highway/Makawao Ayanteff oba Street	ohwav/Maka	Wao Avenu	of the Street	ı		
				ı		
NBLITTHIRE	n	8	ပ		o'	В
SB LT/TH	æ	В	В	В	8	8
SBRT	ပ	ပ	2	၁	၁	ပ
WB LT/TH/RT	8	8	æ	8	80	80
EBLT	٧	٧	¥	V	4	∢
EB TH/RT	٧	٧	¥	4	∢	4
Overall	8	8	В	8	8	8
Kula Highway/KKHS Driveway/Residential Oriveway	CHS Drivewa	y/Residentia	al Oriveway			
NB LT/TH	٧	٧	4	4	¥	4
SBLT	8	A	ပ	8	U	8
WBLT	ш,	3	٠d	L.	Ŀ	L.
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*V/c (volume to capacity ratio) > 1.0

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<u>Haleakala Highway/Old Haleakala Highway (Western Intersection)</u>

during the 20-minute period before the start of the KKHS school day (8:00 AM).

will experience LOS F conditions in the vicinity of KKHS and

Aapueo Parkway

on Kuta Highway

inconsistently with traffic controls, northbound through vehicles

the intersection operating overall at LOS A during the lane on Haleakala Highway to receive northbound left-turns, will result in phasing that would allow these two movements to proceed through the (i.e. creating a separate phase for each approach). Using the right-of-way to the northbound left-turn traffic on Old Haleakala Highway will stop all the westbound through traffic on Haleakala Highway and assign shown in Table 14 assume a traffic signal system phasing such that the signal traffic will operate at LOS F during the AM peak hour of traffic. The results Northbound left-turn traffic will operate at LOS E and westbound through AM peak hour of traffic and LOS B during the PM peak hour of traffic. Haleakela Highway, the Intersection will operate overall at LOS E during the The merging of northbound vehicles turning left onto Haleakata Highway hours of traffic with all individual movements operating at LOS D or better. intersection simultaneously, which will require provision of an acceleration With the Installation of a traffic signal system M and PM peak and widening of an altemate signal

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Year 2006 with Phase 1 and Phase 2 Traffic generated by Phase 1 and Phase 2 of the Project was added to

of Base Year 2005 and Base Year 2006 mitigative measures, traffic at the study

intersections will operate at LOS D or better except at the following locations.

that traffic will operate similar to Base Year 2006 conditions. With implementation

and does not account for delays caused by vehicles on Kula Highway yielding to

vehicles turning into and out of the KKHS driveway and vehicles turning out of

Aspuso Parkway during the AM peak hour of traffic. If drivers continus to behave

1 and Phase 2 at the study intersections during the AM and PM peak hours of

intersections. Figure 10 shows the Year 2005 traffic volumes and LOS with Phase Table 14 summarizes the Year 2006 LOS with Phase 1 and Phase 2 at the study

traffic. The LOS analysis assumes that drivers behave according to traffic controls

the Project. Analysis of the Year 2006 traffic conditions with the Project Indicates

the Base Year 2006 traffic volumes to estimate the Year 2006 traffic volumes with

with wastbound through vehicles on Haleakala Highway will operate at LOS C during the AM peak hour of traffic and LOS B during the PM peak hour of traffic.

Haleakala Hiohway/Makawao Avenue

With a protected left-tum phase for the minor street approaches at LOS C during the AM peak hour of traffic and LOS D during the PM eastbound left-turn, and northbound and wastbound through traffic will and widening of Haleakala Highway, the Intersection will operate overall peak hour of traffic. The northbound, southbound, westbound and continue to operate at LOS E during the PM peak hour of traffic.

Kula Highway/KKHS Driveway/Residential Driveway

The wastbound left-turn from KKHS will operate at LOS F during the AM and PM peak hour of traffic. The westbound right-turn from KKHS will operate at LOS F during the AM peak hour of traffic. Eastbound traffic on the shared driveway approach will operate at LOS F during the AM and PM peak hours of traffic. However, few vehicles are projected to use the shared driveway approach, ten (10) vehicles during the AM peak hour of traffic and ten (10) vehicles during the PM peak hour of traffic. The projected Year 2008 with Phase 1 and Phase 2 traffic volumes at this intersection during the AM and PM peak hours of traffic do not meet the peak hour warrant for the installation of a traffic signal system as described in the $\overline{MUICD ext{-}2000}$.

<u>Haleakala HighwavíKula HighwavíOld Haleakala Highwav (Five Trees</u> This signalized Intersection will operate overall at LOS D during the AM and PM peak hours of traffic. The northbound left-turn, southbound left-

tum and traffic in the westbound shared left-turn/through lane will operate at LOS E during the AM and PM peak hours of traffic. Southbound through

Kule Highway/Asoueo Perkway

traffic will operate at LOS E during the PM peak hour of traffic.

With the Installation of a traffic signal system, this intersection will operate overall at LOS C during the AM peak hour of traffic and LOS D

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at LOS E during the PM peak hour of traffic. During the PM peak hour of during the PM peak hour of traffic. The northbound left-turn will operate traffic, this Intersection will be operating near capacity. Any additional traffic at this intersection other than what is projected for Year 2006 with the Project may require eastbound double left-turn lanes on Aapueo Parkway. This would also require widening of Kula Highway to receive traffic from the double left-turn lanes on Aapueo Parkway.

Table 14 LOS at Study Intersections Year 2006 With Phase 1 and Phase 2

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Highway (Western Intersection) Highway (Western Intersection, E* B B E* B B* C* B B* C* C* B B* C*	Helmeler I	Hour	Hour	Hour	Hour		Hour
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Table 14 (continued) LOS at Study Intersections Year 2006 With Phase 1 and Phase 2

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06 with Phase 2	PM Peak Hour		ш	ш	ပ	ш	ပ	æ	ш		۵	ш	٥	ပ	۵	on)	ш	ပ	ш	ш	O	ш	۵	۵		ပ	ပ	٥	A	В	٧	၁
Year 2006 with Phase 1 & Phase	AM Peak Hour		٥	٥	ပ	٥	ပ	8	۵	٥	В	۵	ပ	В	ပ	Trees Junction)	ш	٥	ш	٥	ပ	ш	ပ	۵		O	Y	၁	8	В	٧	В
2006 with	PM Peak Hour		ш	E	В	Ε	၁	В	Ш	ш	Ω	ш	۵	ပ	٥	Highway (Five	Œ	ပ	Ш	۵	ပ	ш	۵	O		ပ	J.	۵	4	В	٧	O
Base Year 2006 with Mitigative Measures	AM Peak Hour		-	۵	0	٥	၁	8	0	Ð	8	Q	ပ	æ	ပ	Haleakala Hig	Ш	ٍم	۵	۵	၁	ш	၁	٥		0	4	o	<u>_</u>	o	4	В
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	<u> </u>	Haleakala Highway/Makawao	NBLT	NB TH	NBRT	SBLT	SBTH	SBRT	WBLT	WB TH	WBRT	EBLT	EB TH	EBRT	Overall	Haleakala Highway/Kula	NBLT	NB TH	SBLT	SBTH	SBRT	WB LT/TH	EB LT/TH	Overall	모	NBLT	NBRT	WBLT	WBTH	EB 7H	EBRT	Overall

*V/c (volume to capacity ratio) > 1.0

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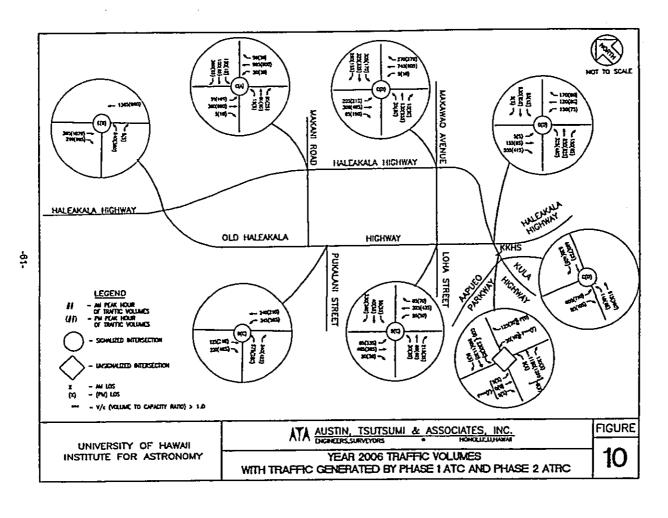
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Table 14 (continued) LOS at Study Intersections Year 2006 With Phase 1 and Phase 2	Base Year 2005 with Year 2006 with Mitigative Measures Phase 1 & Phase 2	AM Peak PM Peak AM Peak Hour Hour Hour	Avenue/Loha Street	8 C B	B B B	4	0	AAAAA	AAAA	S C B C	ıtial Driveway	8 8 8	8 0 8	F. F. F.	E D F D	F* F F* F		1	1	:	lited)	B E B E		0 8 0 8	AAAAA	0 0	ပ	0 0 0 0 0
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Table 14 OS at Stud	<u>5</u>	PM Peak Hour	vao Avenue	8	В	O	8	¥	4	8	//Residentia	٨	¥	ш	ပ	ш	ay	4	F	8	Parkway (signalized)	ı	;			,	1	:
L Year 2	Existing	AM Peak Hour	Highway/Makawao	В	8	O	_	4	4	B	1S Driveway	4	m	L	O	L	ueo Parkw	4	F	В		,	,		;		;	1
		1	Old Haleakala High	NB LT/TH/RT	SBLT/TH	SBRT	WB LT/TH/RT	E8 LT	EB TH/RT	Overall	Kula Highway/KKHS Driveway/Residential	NBLTMH	SBLT	WBLT	WBRT	EB LT/TH/RT	Kula Highway/Aapueo Parkway	NBLT	TJ 83	EB RT	Kula Highway/Aapueo	NBLT	NB TH	SB TH	SBRT	EBLT	EBRT	Overail

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CONCLUSIONS

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Existing

The northbound left-turn at the Haleakala Highway/Old Haleakala Highway (Western Intersection) currently operates at LOS F during the PM peak hour of traffic. Review of 24-hour traffic volumes collected in 2001 by SDOT at this intersection Indicates the installation of a traffic

signal system is warranted.

- Some movements at the Haleakala HighwaylMakani Road Intersection currently operate at LOS E or LOS F during the AM and PM peak hours of traffic. Review of 24-hour traffic volumes collected in 2001 by SDOT at this location indicate the installation of a traffic signal system is warranted. A traffic signal system at this intersection is planned for construction by SDOT and for the purposes of this study assumed to be operational by Year 2005.
- The westbound left-turn and traffic on the eastbound shared driveway approach at the Kula Highway/KKHS Driveway/Residential Driveway intersection currently operate at LOS E or LOS F during the AM and PM peak hours of traffic. Existing traffic volumes at this intersection do not warrant installation of a traffic signal system. It is not uncommon, however, for a low volume side street to experience long delays especially when trying to cross or execute a left-turn onto a major regional facility such as Kula Highway. In addition, few vehicles use the shared driveway approach, five (5) vehicles and three (3) vehicles during the AM and PM peak hours, respectively.
- The eastbound left-turn at the Kula Highway/Aapueo Parkway Intersection operates at LOS F during the AM and PM peak hours of traffic. Existing traffic volumes at this intersection warrant the installation of a traffic signal system. A traffic signal at this intersection is currently in the design process and for the purposes of this study assumed to be operational by Year 2005.

Base Year 2005 œ.

The following are the conclusions of the traffic study for conditions for Base Year 2005 without traffic generated by the proposed Project.

- Construction of the known developments near the Project could potentially generate approximately 574 and 477 total trips during the AM and PM peak hours of traffic, respectively.
- At the Haleakala Highway/Old Haleakala Highway (Western Intersection), the northbound left-turn will operate at LOS F during the AM and PM peak hours of traffic. With the installation of a traffic signal system, the northbound left-turn and westbound through traffic will operate at LOS F during the PM peak hour of traffic. This is assuming phasing such that the signal will stop all the westbound through treffic on Haleakala Highway and assign the right-of-way to the northbound traffic on Old Haleakala widening of Haleakala Highway from Hana Highway to the Old provide an additional westbound through lane. Haleakala (Western Intersection) as a single lane feed would allow the traffic northbound left-tum from Old Haleakala Highway would have a dedicated lane west of the intersection. Using this traffic signal Highway (Western Intersection) operating overall at LOS A with all Highway (i.e. creating a separate phase for each approach). The Haleakala Highway/Haleakala Highway (Western Intersection) will Highway east of Old Haleakala Highway/Haleakala Highway phasing will result in the Haleakala Highway/Old Haleakala individual movements operating at LOS D or better during the AM signal system to only stop eastbound traffic on Haleakala Highway and northbound traffic on Old Haleakela Highway. and PM peak hours of traffic. N
- With the installation of a traffic signal system at the Haleakala Highway/Makani Road Intersection, all Individual movements will operate at LOS D or better, ന്

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- Haleakala Highway will be near capacity within the study area with some movements at the Haleakala Highway/Makawao Avenue Intersection operating at LOS E. 4
- operate at LOS F during the AM and PM peak hours of traffic. In At the Kula Highway/KKHS Driveway/Residential Driveway, the addition, the westbound right-turn will operate at LOS E during the AM peak hour of traffic. Traffic volumes at this intersection are not likely to warrant installation of a traffic signal system. It is not long delays especially when trying to cross or execute a left-tum eastbound traffic on the shared residential driveway approach will uncommon, however, for a low volume side street to experience ten (10) vehicles during the AM peak hour of traffic and ten (10) onto a major regional facility such as Kuia Highway. In addition, faw vehicles are projected to use the shared driveway approach. westbound left-turn from the KKHS driveway approach vehicles during the PM peak hour of traffic. เก่
- With the installation of a traffic signal system at the Kula Highway/Aapueo Parkway intersection, all individual movements will operate at LOS D or better.

Base Year 2006 ပ

The following are the conclusions of the traffic study for conditions for Base Year 2006 without traffic generated by the proposed Project.

- Construction of the known developments near the Project could potentially generate approximately 1,205 and 2,056 total trips during the AM and PM peak hours of traffic, respectively. ÷
- Haleakala Highway will be operating at overcapacity conditions between the Haleakala Highway/Old Haleakala Highway (Westem Intersection) and Five Trees Junction with some movements at the Haleakala Highway/Old Haleakala Highway (Western Intersection), Haleakala Highway/Makani Road and Haleakala Highway/Makawao Avenue intersections operating at LOS E or તં

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- Highway/Old Haleakala Highway (Western Intersection) to west of and westbound through traffic will operate at LOS F. This is northbound left-turning vehicles. In this case, vehicles turning left controlled by the traffic signal system and would be allowed to With widening of Haleakala Highway from three (3) to four (4) the Five Trees Junction, the Haleakala Highway/Old Haleakala Highway intersection northbound left-turn will operate at LOS E creating a separate phase for each approach). It may be possible simultaneously if an acceleration lane is provided to receive the Haleekale Highway would merge with traffic further west of the intersection. The westbound through vehicles would not be lanes (two (2) lanes in each direction) from the Haleakala assuming phasing such that the signal will stop all the westbound through traffic on Haleakala Highway and assign the right-of-way to the northbound left-turn traffic on Old Haleakala Highway (I.e. to allow these movements to proceed through the intersection from northbound Old Haleakala Highway onto westbound proceed continuously. Using this alternate traffic signal will result In the Intersection operating overall at LOS A with all individual movements operating at LOS O or better during the AM and PM peak hours of traffic.
- Widening of Haleakala Highway to four lanes as described will result in all Individual movements at the Haleakala Highway/ Makani Road operating at LOS D or better.

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- With the widening of Haleakala Highway and provision of a protected left-turn phase for traffic on the minor street approaches, some movements at the Haleakala Highway/Makawao Avenue intersection will operate at LOS Eduring the PM peak hour of traffic.
- The Five Trees Junction will be near capacity with some movements operating at LOS E.

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- At the Kula Highway/KKHS Driveway/Residential Driveway, the westbound left-turn from the KKHS driveway approach and eastbound traffic on the shared residential driveway approach and eastbound traffic on the shared residential driveway approach will operate at LOS F during the AM and PM peak hours of traffic. In addition, the westbound right-turn will operate at LOS E during the AM peak hour of traffic. Traffic volumes at this intersection are not likely to warrant installation of a traffic signal system. It is not uncommon, however, for a low volume side street to experience long delays especially when trying to cross or execute a left-turn onto a major regional facility such as Kula Highway. In addition, few vehicles are projected to use the shared driveway approach, ten (10) vehicles during the PM peak hour of traffic.
- 8. The Kula Highway/Aapueo Parkway intersection will be approaching capacity with the northbound left-turn operating at LOS E during the PM peak hour of traffic.

Year 2005 with Phase 1

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The following are the conclusions of the traffic study for Yaar 2005 with Phase 1 of the Project,

- Development of Phase 1 of the Project could potentially generate approximately 31 and 24 total trips during the AM and PM peak hours of traffic, respectively.
- 2. The trip generation estimate for Phase 1 is conservative as it assumes worst-case conditions for the peak hours of traffic. IFA staff will likely enter and exit at various times of the day based on viewing conditions at the summit rather than at a fixed time.
- Approximately two-thirds of the estimated Phase 1 traffic should
 be considered as "diverted or re-routed existing traffic" since
 Phase 1 is a relocation of the existing IFA Walekoa Laboratory in
 Kula. The analysis is conservative as Project-generated traffic was
 added to base year volumes without accounting for the diversion.
- 4. Traffic operations will be similar to Base Year 2005 conditions.

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Year 2006 with Phase 1 and Phase 2 шi

The following are the conclusions of the traffic study for Year 2006 with Phase 1 and Phase 2 of the Project.

- potentially generate approximately 97 and 91 total trips during the Development of the Project (Phase 1 and Phase 2) could AM and PM peak hours of traffic, respectively.
- Traffic operations will be similar to Base Year 2006 conditions. લં
- The Kula Highway/Aapueo Parkway intersection will be operating near capacity. Any additional traffic at this intersection may require eastbound double left-turn lanes on Aapueo Parkway.

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RECOMMENDATIONS

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Without Project-Generated Traffic

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The following are the recommendations of the traffic study wilhout Project-generated traffic.

Base Year 2005

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- systems with existing traffic signals along Haleakala Highway at Kula Highway for turning movements on the minor approaches at the intersections. Interconnect and synchronize these traffic signal Makawao Avenue and the Five Trees Junction. Synchronization of these traffic signal systems may provide additional gaps in traffic on Install traffic signal systems at the Haleakala Highway/Old Heleakala Highway (Western Intersection) and Halaakala Highway/Makani Road unsignalized Kula Highway/KKHS Driveway/Residentlal Driveway Intersection.
- Install a traffic signal system at the Kula Highway/Aapueo Parkway

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Base Year 2006 તં

- Widen Haleakala Highway to four (4) lanes, (two (2) lanes in each direction) from the Haleakale Highway/Old Haleakala Highway (Western Intersection) to west of the Five Trees junction.
- Highway. Provide a traffic signal system phasing such that the At the Haleakala Highway/Old Haleakala Highway (Western Intersection), provide a westbound acceleration lane on Haleakala Highway to receive northbound left-turns from Old Haleakala westbound through traffic on Haleakala Highway and northbound left. turn traffic proceed through the intersection simultaneously. In this case, vehicles turning left from northbound Old Haleakala Highway onto westbound Haleakala Highway would accelerate and merge with traffic on Haleakala Highway further west of the intersection. The westbound through vehicles would not be controlled by the traffic signal system and would be allowed to proceed continuously.
- Revise the traffic signal system at the Haleakala Highway/Makawao Avenue intersection to provide a protected left-tum phase for traffic on the minor street approaches.
- Adjust the traffic signal timing at the Five Trees Junction to be coordinated with the revised traffic signal system at the Haleakala Highway/Makani Road Intersection.

With Project-Generated Traffic œ.

The following are the recommendations of the traffic study with Projectgenerated traffic.

Year 2005 with Phase 1

There are no specific recommendations of the traffic study with traffic generated by Phase 1 of the Project.

Year 2006 with Phase 1 and Phase 2 ~

There are no specific recommendations of the traffic study with traffic generated by Phase 2 of the Project.

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ERENCES

- Austin, Tsutsumi & Associates, inc., Kulamaly Traffic Study, March 1997, revised October 1997. ATA ATA REFE
 - Austin, Tsutsumi & Associates, Inc., Traffic Impact Analysis Report for the Kulamalu Assisted Living/Skilled Nursing Facility, Draft Report, July 2003.
 - Austin, Tsutsumi & Associates, Inc., <u>Traffic Impact Report for the Kualono Subdivision</u>. **December 1, 2003.**
- Institute of Transportation Engineers, Trip Generation, 6th Edition, 1997.
- Kaku Associates and Munekiyo & Arakawa, Inc., Final Report, Maul Long-Range Land Transportation Plan, February 1997.
- Kamehameha Schools Maul Campus Website, http://maui.ksbe.edu.
- Parsons Brinckerhoff Quade & Douglas, Traffic Impact Assessment Study, Upcountry Town Center, March 2002.
- Phillip Rowell and Associates, Traffic Impact Analysis for Kamehameha Schools Maui Campus, Draft Report, June 2002.
- State of Hawali, Department of Transportation, Highways Division, Traffic Survey Data (Individual Stations), Island of Maul, 2001,
- Transportation Research Board, <u>Intersection Channelization Design Guide</u>, National Transportation Research Board, <u>Highway Capacity Manual - HCM 2000,</u> Special Cooperative Highway Research Program Report 279, 1985. Report 209, 2000.
- U.S. Department of Transportation, Federal Highway Administration, Manual on <u> Uniform Traffic Control Devices – MUTCD 2000 – Millennlum Edition,</u> December 2000, as amended.

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APPENDICES

APPENDIX A
TRAFFIC COUNT DATA

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Major Street Rakeskab Hwy Minor Street Old Rakeskala Hwy Time of Court 6:30 AM-6:30 AM Westher: Clear File Name : halottari Sile Code : 000000 Start Date : 05/01/20 Page No : 1 Austin Tautsumi & Associates, Inc. 501 Sumner Street, Suite 521 Honolulu, Hawai 98817 Ph. (808)533-3846 Fax (808)526-1267

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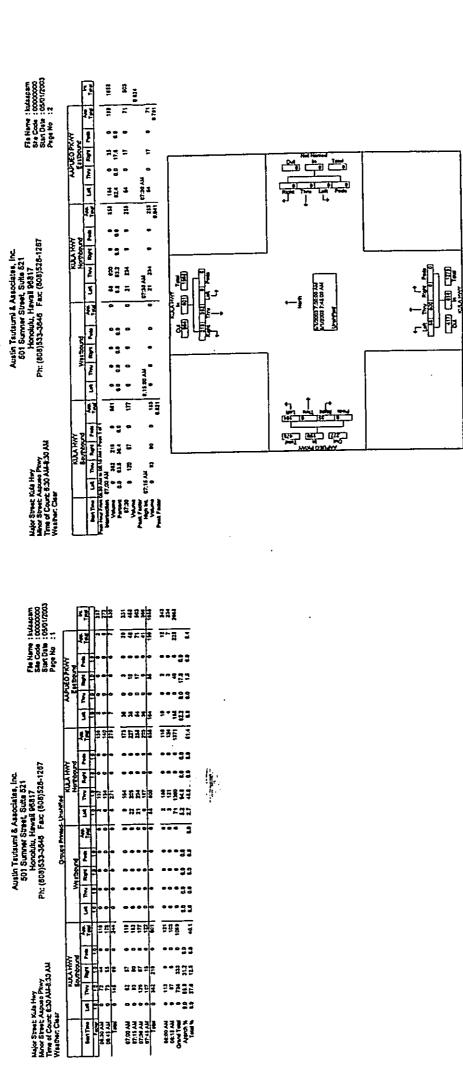
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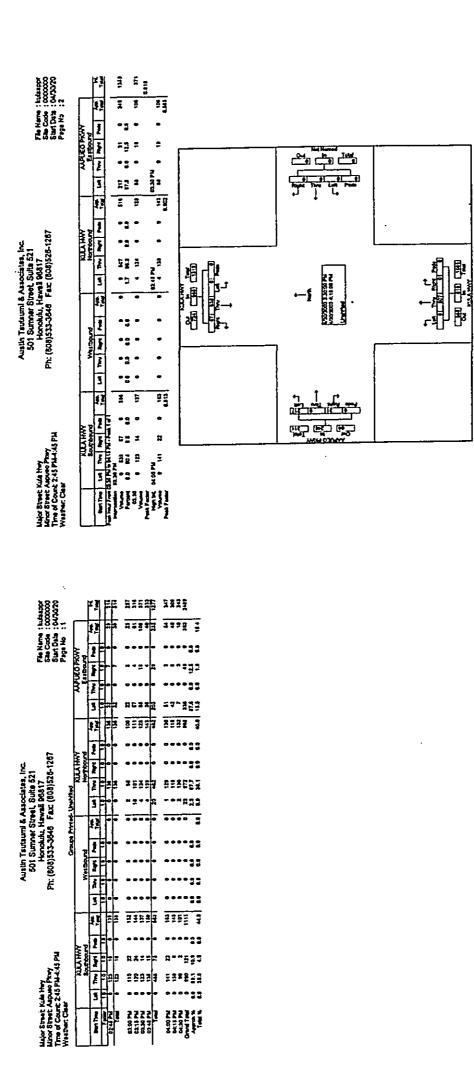
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APPENDIX B

LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS (HCM 2000)

The level of service criteria for unsignalized intersections is defined as the average total delay, in seconds per vehicle. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position.

LOS delay threshold values are higher for two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections than those of signalized intersections. This is because more vehicles pass through signalized intersections, and therefore, drivers expect and tolerale greater delays. While the criteria for level of service for TWSC and AWSC intersections are the same, procedures to calculate the average total delay may differ.

Level of Service Criteria for Two-Way Stop-Controlled Intersections

Average Total Delay (sec/veh)	s10	>10 and ⊴5	>15 and <25	>25 and <35	>35 and ≤0	> 50
Level of Service	4	æ	ပ	٥	ш	IL.

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/EL OF SERVICE OF SIGNALIZED INTERSECTIONS (HCM 2000)

LEVEL OF SERVICE OF SIGNALIZED INTERSECTIONS (HCM 2000)

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort, frustration, fuel consumption and lost travel time. Specifically, level-of-service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period. The criteria are given in Table A-1.

Table A-1. Level-of Service Criteria for Signalized Intersections

Stopped Delay per Vehicle (sec.)	s 10	> 10 and ≤ 20	> 20 and < 35	> 35 and ≤ 55	>55 and ≤ 80	>80
Level of Service	¥	Ø	ပ	۵	ш	u.

Delay is a complex measure, and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the vic ratio for the lane group or approach in question.

Using the HCM calculation procedure, LOS is determined for each individual approach, as well as for the intersection as a whole.

Level-of-service A describes operations with very fow delay, up to 10.0 seconds per vehicle. This level of service occurs when progression is extremely favorable, and most vehicles. This level of service occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level-of-service B describes operations with delay greater than 10.0 and up to 20.0 seconds per vehicles. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level-of-service C describes operations with delay greater than 20.0 and up to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle tengths. Individual cycle faitures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level-of-service D describes operations with delay greater than 35.0 and up to 55.0 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

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Level-of-service E describes operations with delay greater than 55.0 and up to 80.0 seconds per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths and high v/c ratios. Individual cycle failures are frequent occurrences.

Level-of-service T describes uperalises with delay in expass of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high vic ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

APPENDIX C LEVEL OF SERVICE CALCULATIONS

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APPENDIX C LEVEL OF SERVICE CALCULATIONS

| CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET |
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SIGNAL2000/IEAPAC[Ver 1.11.00] - Capacity Analysis Summary

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CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

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170 544 6 1 10.3 | B+1 5 1 18.1 | B | 148 1 16.2 | B | 19 1 17.3 | B | 34.3 | C | 27.6 | C | 10.412 10.902 10.080 10.014 10.430 10.119 227 1 250 529 648 49 | 12/1 |0.216 |0.383 | | 12/1 |0.381 |0.383 | | 12/1 |0.014 |0.050 | | 12/1 |0.034 |0.417 | 12/1 |0.160 |0.283 | 12/1 |0.000 |0.283 Approach 답답없 9

242 6848 10.4 | B+| 10.6 | B+| 35.6 |*D+| 10.026 10.080 10.639 1111 1475 1439 10.417 | 12/1 |0.046 | | 24/2 |0.052 | | 12/1 |0.084 | EB Approach 컱끍抗

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Institute for Astronomy AM Peak Hour of Traffic Existing

SIGNAL2000/TEAPAC(Ver 1.11.00) - Summary of Parameter Values

Intersection Perameters for Int # 0 - Haloakala Highway/Makavao Aven
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SINULATION PERIOD C S
NODELOCATION 0 0
QUEUTHOODELS 1 90 25 40

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Haleskala Highway/Hakawao Aven Degree of Saturation (Y/c) 0.56 Vehicle Delay 22.6 Level of Service C+

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Surmary of Parameter Values

Intersection Parameters for Int # 0 - Haleakala Highway/Hakawao Avan MCTROANEA.
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Intersection Averages for Int # 0 - Kula Highway/Haleakala Highway Degree of Saturation (v/c) 0.70 Vehicle Delay 24.4 Level of Service C+

SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary

Sq. 61	Sq 61 Phase 1 Phase 2 Phase 3 Phase 4	Phase 2	Phase 3	Phase 4	
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	OFF= 0.04	OFF 0.04 OFF=16.7% OFF=26.7% OFF=70.0%	OFF-26.74	1 OFF=70.04 1	
	C# 60 88C	C- 40.0 sec	* 66.74 X=2	Ca 60 sec Ca 40.0 sec a 66.7% X=20.0 sec a 33.3%	Ped= 0.0 sec = 0.0%
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12/24/03

0 - Kula Highway/Haleakala Highway

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

Intersection Parameters for Int #
METROANEA NONCED STRUIATION PERIOD 15
LEVELOFSERVICE C 5
NODELOCATION 0 0
QUEUEHODELS 1 90 25 40

Institute for Astronomy PM Peak Hour of Traffic Existing

SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Kula Highway/Haleskala Highway Degree of Saturation (v/c) 0.56 vehicle Delay 18.1 Level of Service

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Old Heleakala Hwy/Pukalani St Degree of Saturation (v/c) 0.60 vehicle Delay 20.2 Level of Service C+

+ *>			50 0" 0% 0% 0% 0% 0% 0% 0	Adj HC4 L Queue Volume v/c Dalay 8 Model 1		217 0.242 7.2 % 96 612 0.864 27.4 C+ 480	24,3 C+	203 0.252 11.0 B+ 103 303 0.856 33.2 +C 256	13.7 B÷	234 [0.197 2.6 A 66
1 + + + + + + + + + + + + + + + + + + +	Phase	·	G/C=0.3 G= 21. Y+R= 0. OFF=65.	Service Rate 8C (vph) 6E		866 897 655 708		133 759 183 308		750 1188 1188
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SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - 01d Haleskala Hwy/Pukalani St
Degree of Saturation (v/c) 0.45 Vehicle Delay 10.7 Level of Service B+

Phase 1 Phase 2 Phase 3		G/C=0.417 G= 25.0" X+R= 0.0" OFF=58.3%
Phase 2	***	G/C=0.083 G= 5.0" X+R= 5.0" OFF=41.7%
Phase 1		G/Cm0.333 G/Cm0.083 G/Cm0.417 Gm 20.0" Gm 5.0" Gm 25.0" Y+Rw 5.0" X+Rm 5.0" Y+Rw 0.0" OFFw 0.0% OFFw41.7% OFFw58.3%
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SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

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12/23/03 10:38:18

SIGNAL2000/TEARACIVer 1.11.00] - Summary of Parameter Values

Phasing Parameters

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######################################	/Hakawao	Lavel of Service B+				
0/TEAPAC[Ver 1.11.00] - ton Averages for Int # ree of Saturation (v/c) Phase 1 Phase 2 * * * * *	Capacity Analysis Summary 0 - Old Heleskels Highway	0.46 Vehicis Delay 14.1	i — — — — — — — — — — — — — — — — — — —	 ^ ;>	/(C=0.400 24.07 +78 5.07	
SIGNAL200 Interesct	000/TEAPAC[Ver 1.11.00] - oction Averages for Int.	egree of Saturation (v/c)		 	G/C=0.050 G= 3.0" Y+R= 5.0" OFF=38.3%	

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受	NB Approach	ទួ													19.2 B		Д		
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- Summary of Parameter Values

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SIGNAL2000/TEAPAC[Ver 1.11.00] ~ Summary of Parameter Values

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12/24/03

0 - Haleskala Highway/Makani Road

SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

Institute for Astronomy PM Peak Hour of Traffic Base Year 2005 with traffic signal

Intersection Parameters for int #
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	Summary of Parameter Values it # 0 - Haleskela Highway/Makawao Aven	NB 0.0 0.00 0.00 0.00	RT TH LT 10 100 30	12.0 12.0 1 1 NORM NORM	2.0 2.0	NO XEG	2000	9866	1583 1863	LEADLAGS	ant load	
	mmary of Par:	MB 0.00 0.00 0.00 0.00	RT TH LT 260 695 5	12.0 1 10.0 10.0	8.08	>+ 10 10 C	, v	1900 1900 1900 1.00 1.00 1.00 1.00 1.00 1.00	1863	NO NO	3.00 39.00 5.00 5.00	
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Institute for Astronomy AM Peak Hour of Traffic Base Year 2005	SIGNAL2000/TEAPAC[Ver 1.11.00] Intersection Pareneters for METROAREA	SINULATION PERIOD LEVELOFERNICE O NODELOCATION O QUEUEHODELS I 90 2 APPLABELS GRADES PEDLEVELS BIKEVOLUMES PARKYOLUMES PARKYOLUMES RAGHTIURNONREDS UFFITURNONREDS UFFITURNONREDS	Movement Parameters HOVLABELS VOLUMES 275 LEVENIES	ALDINS LANES GROUPTYPES HTTLIZATIONS	TRUCKPERCENTS PEAKHOUNFACTORS	ACTUATIONS REQUESTANCES HINIMUS STANDINGS	ENDGAIN STORAGE	IDEALSATFLOWS FACTORS DELATRACTORS WERNOWN CROSS	SATURATIONFLORS	PERMITANG FAREHOCOFE SEQUENCES PERMITANS CVERLANS FYCT-FO	GREENTHES YELLONTINES	KCESS
12/24/03	Ac Aven Avel of Service D+		Padm 0.0 mac m 0.0%	HCM L Quaum Delay S Hodel 1	4 4	18.4 B 244 ft. 31.8 C 299 ft. 59.2 *E+ 386 ft.	26.1 C+	18.2 B 10 ft 26.8 C+ 104 ft 26.6 C+ 32 ft	42.9 D+	22.5 C+ 268 ft 50.5 +D 949 ft 40.5 +D+ 7 ft	38.9 D+	13.2 B+ 15 ft 14.0 B+ 102 ft 67.4 *E+ 310 ft
iffic	far 1.11.00] - Capacity Analysis Summary iss for int # 0 - Haleskela Highway/Makawao uration (v/c) 0.65 Vehicle Delay 38.9 Ieve	+	Gm 70.0 meg m 77.8% %m20.0 seg m 22.2% Pe	g/C Service Rate Adj		0.234 0.256 623 721 306 0.424 0.234 0.256 335 476 289 0.607 0.311 0.256 217 323 294 0.902		0.128 0.367 451 581 11 0.019 0.155 0.256 335 476 111 0.233 0.157 0.256 111 171 33 0.180		0.295 0.433 546 686 289 0.421 0.476 0.433 684 807 772 0.957 0.120 0.056 1 80 6 0.061		0.522 712 827 17 0.021 0.522 1729 1848 244 0.132
Institute for Astronomy AM Peak Hour of Traffic Base Year 2005	SIGNAL2000/TEAPAC(Ver 1.11.00) - Intersection Averages for Int # Degree of Saturation (v/c)	Sq 16 Phase 1 + + + + + + + + + + + + + + + + + +		Lane Width/ Group Lanes Ro	SB Approach	RT 12/1 0. TH 12/1 0. LT 12/1 0.	NB Approach	RT 12/1 0.1 TH 12/1 0.1	MB Approach	RT 12/1 0.7 TH 12/1 0.4 12/1 0.4 12/1 0.1 12/1 0.1 0	ZB Approach	RT 12/1 0.132 TH 24/2 0.156 LT 12/1 0.214

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Institute for Astronomy 12/24 PM Peak Hour of Traffic Base Year 2005	EAPAC [Ver 1.1] ton Parameter RHIOD CE	NODELOCATION 0 0 QUEURHODELS 1 90 25 40 Approach Parameters SB WB WB EB GRADES 0.0 0.0 0.0 0.0 0.0 GRADES 0.0 0 0 0 0 0 0 BRICHOLDINES 0 0 0 0 0 0 0 0 BUSHVOLDHES 0 0 0 0 0 0 0 0 RIGHTUNONICES 0 0 0 0 0 0 0 RIGHTUNONICES 0 0 0 0 0 0 0 PRINCALLING 0 0 0 0 0 0 0	MONORMANT FARAMETER RT TH LT RT TH LT RT TH LY RT TH VOLUMES 160 305 135 210 420 10 15 390 45 45 345 WOLUMES 12,0 12,0 12,0 12,0 12,0 12,0 12,0 12,0	ZATIONS NORM NORM NORM NORM NORM NORM NORM NORM	8 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	190 100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	PARAMETER PARAMETER SEQUENCES 16 SEQUENCES 10 NO NO OVERHARS YES VEX.LIB 60 180 10 CYCLES 60 60 180 100 100 GREINTHERS 5.00 3 12 0 5 CRITICALS 5	CXCESS
12/24/03 11:09:49	ven 1 of Service C		0.0	Y is Nodel 1	8 A 77 ft 8 B 227 ft 2 50 142 ft		0 C+ 179 ft C+ 179 ft C+ 9 ft	1 B+ 34 ft 1 B 129 ft 3 *D+ 228 ft
	ity Analysis Haleskala Hig Vohicle Dela	++++++++++++++++++++++++++++++++++++++	20.0 sed = 33.34 Pe	Service Rate Adj HCH GC (vph) GE Volume v/o Delay 22.8	866 897 178 0.198 6,8 525 590 339 0.575 18,5 132 171 150 0.857 51,2	688 739 17 0.023 8. 525 590 433 0.734 23. 200 250 50 0.200 15.	332 422 233 0.552 24.9 423 497 467 0.940 48.5 70 106 11 0.093 26.6	501 581 50 0.086 14.3 1232 1298 383 0.295 15.3 225 295 250 0.847 44.3
Institute for Astronomy PM Peak Hour of Traffic Base Year 2005	AC[Ver 1.11.00] - Serages for Int # Saturation (v/c)	+ + + + + + + + + + + + + + + + + + +	ac G= 40.0 sac =	ane Width/ g/C Ser Group Lanes Reqd Used gC Approach	RT 12/1 0.171 0.567 8 TH 12/1 0.221 0.317 5 LT 12/1 0.351 0.317 1.	12/1 0.046 0.467 12/1 0.270 0.317 12/1 0.000 0.317	Approach	12/1 0.081 0.367 5 24/2 0.134 0.367 12 12/1 0.181 0.167 2

NONE 10

Institute for Astronomy AM Peak Hour of Traffic Base Year 2005

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SIGNAL2000/IEAPAC[Ver 1.11.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Kula Highway/Haleskala Highway D+ Degree of Saturation (v/c) 0.79 Vehicle Delay 39.6 Level of Service D+

		0.0 mps4
Sq 61 Phase 1 Phase 2 Phase 3 Phase 4	**** ** *** *** *** *** *** *** *** *** *** *** *** *** ** *** *** *** *** *** *** *** *** *** *** *** *** * **	G/C=0.078 G/C=0.067 G/C=0.378 G/C=0.256 G= 7.0" G= 6.0" G= 34.0" C= 23.0" Y-R= 5.0" Y-R= 5.0" Y-R= 5.0" Y-R= 5.0" C= 23.0" C= 23.0" C= 20.0\$ OFF=63.3\$ OFF=25.6\$ OFF=68.9\$ C= 90 sec G= 70.0 sec = 77.8\$ Y=20.0 sec = 22.2\$
39 61	North	,

9/C | Service Rate| Adj | | HG4 | L | Queus | | Lane | | | | |

_ i	Group Lanes Radd Used 8C (wph) 8E Volume v/c Delay	- !	Lanes	<u> </u>	Redd	5	Ţ		2	ğ	₩ .	-	Volum	-	\$	[Delay		<u> </u>	S [Wodel 1]	귤!	
Д.	SB Approach	ប្															32.7	υ	,,			
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l i	E	!	12/1 0.524 0.500 12/1 0.251 0.200	20	524	0.5	88	!	823 203		88	931 - 349 -		으으	872 0.937 294 0.831		42.6 *D+ 1017 ft 50.1 *D 364 ft	==	[E]	36.	22	ز در در
e i	WB Approach	2	_					i									40.3	å	±			
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<u>e</u>	ZB Approach	힣		ŀ													27.9	υ				
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SIGNAL2000/TEAPAC(Ver 1.11.00] - Summary of Parameter Values

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Kula Highway/Haleskala Highway	NO. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	120 12.0 12.0 12.0 12.0 12.0 12.0 12.0 1	Leadlags Offset Pedtine
1 O	が NON 0 20 20 0 0 0 0 0	12.5 100 120 12.0 12.0 0.0 1	NO NO XES YES 10 34.00 5.00 5.00 5.00
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of Parameter Values SIGNAL2000/TEAPACIVer 1.11.00] - Summary Institute for Astronomy pm Peak Hour of Traffic Base Year 2005 12/24/03

Ped= 0.0 sec = 0.0% ection Averages for Int # 0 - Kula Highway/Haleakala Highway Degree of Saturation (v/c) 0.67 Vehicle Delay 22.0 Level of Service C+ Institute for Astronomy
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Base Year 2005

SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Rula Highway/Haleakala H

Degree of Saturation (v/c) 0.67 Vehicle Delay 22.0 Intersection Averages for Int # 0 - Rula Highway/Haleakala H

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** | ** | | G/C=0.100 | G/C=0.050 | G/C=0.367 | G/C=0.150 | G= 6.0" | G= 22.0" | G= 22.0" | G= 9.0" | Y+R= 5.0"
V/c | Delay | S | Model 1

£ ## ### 13.4 | B+| 4 £ 22.7 | 4C+| 375 £ 26.1 | 7C+| 44 £ 1 417 26.3 |*C+| 95 ţ ± ₽₽ ů 26.3 30.5 | C= 6.0" | C= 5.0" | C= 2.0" | C= 2.0" | C= 9.0" | C= 6.0" | Y+R= 5.0" | Y+R=

FT TH 12.0 12.0 12.0 12.0 12.0 12.0 2.0 2.0 2.0 0.90 0.90 3.0 0.90 0.90 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 1900 1900 1,00 1,00 1,00 1,00 1,00 1,00 0 1805 0 - Kula Highway/Haleskala Highway Intersection Parameters for int # HZTROARLA NONCED 15 SINUIATON PERIOD 15 LEVELOFSERVICE C 5 NODELOCATION 0 0 0 QUEUTHODELS 1 90 25 40 SB 0.00 0.00 200 0.00 0.00 HOVLABELS

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XES XES 9.00 5.00 Phasing Parameters 61
SEQUENCES NO PERMISSIVES YES OFFICES 60 CHILLS 6.00 CHILLS 5.00 CHILCHIES 5.00 EXCESS

23.2 | C+| 56 ft|

Institute for Astronomy AM Peak Hour of Traffic Base Year 2005

12/23/03

SIGNAL2000/TEAPACIVer 1.11.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Old Haleskels Hwy/Pukalani St Degres of Saturation (v/c) 0.53 Vehicle Delay 14.5 Level of Service B+

			G # 16,74 Pa
	Phase 3		G/C-0.083 G/C-0.283 G= 5.0" G= 17.0" Y+R= 5.0" Y+R= 0.0" OFF=55.0% OFF=71.7% G= 50.0 mec = 83.3% Y=10.0 mec = 16.7%
	Phase 1 Phase 2	***	G/C=0.467 G/C=0.083 G= 28.0" G= 5.0" Y=R= 5.0" Y=R= 5.0" OFF=55.0\$ OFF=55.0\$ G= 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.0 mec = 60.00 me
114611411141	Phase 1	* * * * * * * * * * * * * * * * * * *	G C=0.467 G= 28.0" Y+R= 5.0" OFF= 0.04
	0 bs	No	<i>-</i> ِ,۱۰۰

13.8 B+ 5 | 5.5 |+A | 105 ft| 0 | 17.4 | B | 419 ft| sec = 16.7% Ped= 0.0 sec = 0.0% | HCH | L | Queue | | | Delay | S | Model 1 | 10.266 0/0 | Lane | Hidth/| 9/C | Service Rate| Adj | | Group | Lanes| Reqd Used | 8C (vph) 8E |Volume| 12/1 |0.226 |0.633 | 985 | 1003 | 267 12/1 |0.386 |0.467 | 783 | 826 | 628 NB Approach

141 ft. 253 ft. ## 69 14.2 | B+| 23.2 |+C+| 20.7 | C+ 244 |0.357 | 339 |0.750 | 10.205 10.268 100 1 1188 683 - 625 397 10.750 WB Approach | TH | 12/1 |0.170 |0.367 | LT | 12/1 |0.052 |0.083 10.212 10.084 EB Approach | RT | 12/1 | | TH | 12/1 |

Institute for Astronomy MH Peak Hour of Traffic Base Year 2005

12/23/03

SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

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2. ņ 0 - Old Haleskala Hwy/Pukalani 48 0.0 0.00 0.00 0.00 Intersection Parameters for Int #
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12/23/03 11:12:15	Summary Hwy/Pukalani St ' 11.8 Level of Service B+				
f Traffic	SIGNAL2000/TEAPACIVER 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - old Haleskala Hwy/Pukalani St Intersection Averages for Int # 0 - old Haleskala Hwy/Pukalani St	Sq 0 Phase 1 Phase 2 Phase 3	****		G/Cm0.300 G/Cm0.083 G/Cm0.450 G/Cm0.
Institute for Astronomy PM Peak Hour of Traffic Base Year 2005	SIGNAL2000/TEA Intersection A	eserga 1 o bs	·=·	North -	G/Cm0.300 G/cm0.300 G/cm18.0" G/cm
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	1.00] - £		5.00	0.010	000
Institute for Astronomy AM Peak Hour of Traffic Base Year 2005	SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values	Paramet	28.00 5.00	ENTS 1	ENTS 6
Institute for J AM Peak Hour of Base Year 2005	SIGNT5000/	Phasing SEQUENCES PERMISSIVES OVERLARS	GREENTHES TELLOWINGS CRITICALS	EXCESS PHASTHOVENERS PHASTHOVENERS PHASTHOVENERS	PHASEHOVEHENTS PHASEHOVEHENTS PHASEHOVEHENTS

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Institute for Astronomy PM Peak Hour of Traffic Base Year 2005				12/23/03 11:12:22	Institute for As	tronomy						12/	23/03
SIGNALZ000/TEAPAC[Ver 1.11.00]		- Summary of Parameter Values	seter Values		FM FORK HOUR OF TRACELO Base Year 2005	rate 110						#	11:12:22
Intersection Parameters for Int METRONARA SIMULATION PERIOD 15	Moters for Int # NONCED 15	0	- old Haleskala Hwy/Pukalani	alani St	SIGNAL2000/TEAPAC[Ver 1.11.00]	:[Ver 1.11.00	1	mary o	f Para	Summary of Parameter Values	alums		
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Institute for Astronomy AM Peak Hour of Traffic Base Year 2005

Summary of Parameter Values Intersection Parameters for Int #
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0 - Old Haleskele Highway/Makawao

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Institute for Astronomy Base Year 2005 with traffic signal system PM Peak Hour of Traffic

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary
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APPENDIX C LEVEL OF SERVICE CALCULATIONS

Base Year 2005 with Mitigative Measures

Institute for Astronomy AM Peak Hour of Traffic Base Year 2005 with traffic signal

12/26/03 08:35:01

SIGNAL2000/TEAFAC[Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for int # 0 - Haleskala Highway/Old Haleskal
Degree of Saturation (v/c) 1.21 Vehicle Delay 197.9 Level of Sarvice

Phase 1 Phase 2	**	 	G/C=0.372 G/C=0.572 G= 103.0" X+R= 5.0" X+R= 5.0" G= 103.0" OFF= 0.0% OFF=40.0%
Sq 11 Phase 1 Phase 2		···	G/C=0.372 G= 67.0" X+R= 5.0" OFF= 0.0\$
25,	:	North	

5.6% Ped= 0.0 sec = 0.0% G=170.0 sec = 94.4% Y=10.0 sec C=180 asc

1 }	Group	Lans Width/ g/C Service Rate Adj HCH L Queus Group Lanes Redd Used @C (Vph) @E Volume V/C Delay S Hodel 1		Lane Midth/ g/c Service Rate Adj HGH L Queus Group Lanes Redd Used @C (vph) @Z Volume v/c Delay S Hodel 1	۶ <u>.</u>	Dead Oran	!	50	o g	40	22	707	28	~	U	Δ.			,J 03	gg E	24
м	NB Approach	NB Approach							Ī							N	230.7 F				į
- 1	5	LT 12/1 0.604 0.372 1 631 900 1.366 230.7 *F 2776 ft	7	0.604	2	.372	- 1	-	- 1	63	[8	0	1.36	9	2	6	-		277	Į,
.a. I	MB Approach	ch			į	ļ	İ					:				N	217.5 F				
- !	T.H	TH 12/1 0.842 0.572 649 1066 1444 1.355 217.5 *F 4370 £t		0.842	2	.572	 	649	-	106	9	144	-	1 35		~	7.5	-	<u>.</u>	4370	14
	EB Approach	ch	-														18.2 B		p		
	TH	TH 24/2 0.406 0.572 1700 2025 322 0.159 18.2 B 183 £t	~	0.406	2	.572	—	700	-	202	_	32	~	0.15	6		18.2	-		183	1

Institute for Astronomy AM Peak Hour of Traffic Base Year 2005 With traffic signal

12/26/03

SIGNAL2000/TEAPACIVer 1.11.00] - Summary of Paramater Values

0 - Haleakala Highway/Old Haleakal RT TH LT

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - Haleakala Highway/old Haleakal
Degree of Saturation (v/c) 0.59 Vahicle Delay 13.7 Level of Service B+

			:
			;
Phase 1 Phase 2	*		1 057=38.34
Phase 1	** *	800	1 OFF= 0.0%
Sq 11			

Gr 50.0 sec m 83.3% Ym10.0 sec m 16.7% Pedm 0.0 sec m 0.0% |Width/| g/C | Service Rate| Adj | | HGH | L | Queue | p | Lanes| Reqd Used | GC (vph) @E |Volume| v/c | Delay | S |Model 1|

| 24/2 | 0.270 | 0.533 | 1888 | 1888 | 878 | 0.465 | 8.9 | A | 227 ft | 12/1 |0.232 |0.300 | 465 | 531 | 339 |0.638 | 20.8 |*C+| 238 ft| 16.3 | *B | 481 £t| ដ Ø 16.3

Intersection Parameters for Int # 0 - Haleskala Highway/Old Haleskal
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SIMULATION PERIOD C S
NODELOCATION 0 0
QUEOTHODELS 1 90 25 40 SIGNAL2000/TEAPACIVer 1.11.00] - Summary of Parameter Values 2000 2000 2000 0.00 Institute for Astronomy PH Peak Hour of Traific Base Year 2005 with traffic signal Approach Parameters
APRIABELS
GRADES
PEDLEVELS
BIKEVOLUMES
PARKINGSIDES
PARKOLUMES
BUSVOLUMES
BUSVOLUMES
BUSVOLUMES
UPSTREANVC

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Institute for Astronomy
AM Peak Hour of Traific
Base Year 2005 with traific signal
Base Year 2006 with traific signal
SIGNAL2000/TEAPAC(Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - Haleakala Highway/Old Haleakal
Degree of Saturation (v/c) 0.72 Vehicle Delay 8.3 Level of Service A

			46
Phase 2		 ‡	
Phase 1 Phase 2	*	+	G/C=0.733 G/C=0.156 G= 6.0" G= 14.0" Y-R= 5.0" Y-R= 5.0" OFF=78.91
Sq 0 1		North 	- ((

Gm 80.0 sec = 88.9% Y=10.0 sec = 11.1% Ped= 0.0 sec = 0.0% C# 90 860

| Lane | Hidth/| g/C | Service Rate| Add | HCM | L | Queue |
| Group | Lanes| Reqd | Used | GC (vph) GE | Volume | v/c | Delay | S | Hodel 1]

NB Approach
| LT | 12/1 | 0.543 | 0.733 | 1289 | 1298 | 900 | 0.693 | B.1 | A | 565 ft|

WB Approach
| TH | 12/1 | 0.797 | 1.000 | 1863 | 1863 | 1444 | 0.775 | 2.1 | A | 143 ft|

EB Approach
| TH | 24/2 | 0.170 | 0.156 | 242 | 551 | 322 | 0.584 | 36.9 | De| 191 ft|

Institute for Astronomy AM Peak Hour of Traffic Base Year 2005 with traffic signal

SIGNAL2000/TEAPACIVer 1.11.00] - Summary of Parameter Values

0 - Haleskala Highway/Old Haleskal Intersection Parameters for Int #
HETROAMEA NONCED 15
SIMULATION PERIOD 15
ILVELIOPSERVICE C 3
NODELOCATION 0 0 0
QUEURAODELS 1 90 25 40

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Institute for Astronomy PM Peak Hour of Traffic Base Year 2005 with traffic signal

SIGNAL2000/TEAPACIVer 1.11.00] - Capacity Analysis Summary

0 | Phase 1 | Phase 2 | P 24

NON TO

Leadlags Offset Pedtime

Intersection Averages for int # 0 - Haleskala Highway/Old Haleskal Degree of Saturation (v/c) 0.47 Vehicle Delay 7.7 Level of Service A

7 2000	*	G/C=0.533 G= 32.0" Y+R= 5.0"
T DEBUZ	*	G/C=0.300 G= 18.0" Y+N= 5.0"
	-th	

20.8 C+ | LT | 12/1 |0.232 |0.300 | 465 | 531 | 339 |0.638 | 20.8 |*C+| 238 ft| | Lane | Midth/| g/C | Service Rate| Adj | | HCM | L | Queue | | Group | Lanes | Reqd | Used | gC (vph) @E | Volume | v/c | Delay | S | Hodel 1 |

| TH | 12/1 |0.418 |1.000 | 1863 | 717 |0.385 | 0.1 |*A | 22 Et| 0.1 A HB Approach

EB Approach | TH | 24/2 |0.270 |0.533 | 1888 | 1888 | 678 |0.465 | 8.9 | A | 227 ftl

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SIGNAL2000/TEARAC(Ver 1.11.00) - Summary of Parameter Values	ary of Parameter Values		Dame tear 2005 With Cratile signal	n trattic	s 1gna						
Intersection Parameters for int #	0 - Heleskela Highway/Old Heles	Haleskal	SIGNAL2000/TEAPAC[Ver 1.11.00]	Ver 1.11.	1	(ummary	Summary of Parameter Values	neter	Values		
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APPENDIX C LEVEL OF SERVICE CALCULATIONS

• Base Year 2005 with Phase 1

Institute for Astronomy AM Pesk Hour of Traffic Year 2005 with Phase 1

12/26/03 08:48:27

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - Haleakala Hichway/Old

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	! ! ! ! ! ! ! !			QUEUEMODE
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North -th	•••	 - <u>‡</u>		PEDIEVELS PEDIEVELS BIKEVOLUM PARKINGSI
•	G/C=0.372 G= 67.0" Y+R= 5.0" OFF= 0.0\$	G/C=0.572 G= 103.0" X+R= 5.0" OYF=40.0%		PAKKADLUA BUSYOLUAE RICHTTURN UPSTREAMY
	C=180 sec	G-170.0 sec	G#170.0 sec = 94.4% Y#10.0 sec = 5.6% Padm 0.0 sec = 0.0%	SZECTON STARTON STARTON
Lane	UP Lanes	Width/ g/C Lanes Reqd Used	Lane Width/ g/C Service Rate Ad) HCM L Queus Group Lanea Redd Used 8C (vph) 8E Volume! v/c Delay S Model 1	HIDIAS LANES GROUPTYPE UTILIEATI
NB Approach	roach		230.7 ¥	TRUCKPERC
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EB Approach	roach		IB.2 B	IDEALSATE FACTORS DELAYEACT
Ē	1000 : OFF : CHE OF BOY OF C/70 ! THE			

12/26/03 08:48:32 Values	Highway/Old Haleskal	NB EB 0.0 0.0 0.0 0.0 0.00 0.00 0.00 0.00	TH LT TH TT TH LT CONTROL OF CONT	IEADLAGS NONE NONE OFFSET 0.00 1 PEDTIME 0.0 0
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ray fio 1 r 1.11.00] -	Parameters for Int NONGED) 15 C 5 0 0 90 25 40	Parameters SB 0.0 0.0 0.0 NOWE 20 20 20 0.00 0.00 0.00 0.00 0.00 0.00	Parameters 100 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	nters 11 11 YES YES YES YES 95 180 67.00 103.00 5.00 5.00
Institute for Astronomy AM Peak Hour of Traffic Year 2005 with Phase 1 SIGNAL2000/TEAPAC[Ver 1.11.00]	Intersection Parabeters HZTRONFEA NONCOM SIMULATION PERIOD 1: LEVELOPSERVICE C 5 NODELOCATION 0 0 QUEUTEMODELS 1 90 25 40	Approach Paranapalants APPLABELS APPLABELS PEDLEVELS PRENCYOLUMES PARKINGSIDES PARKINGSIDES PARKOLUMES BUSYOLUMES RIGHTURNONREDS UPSTREMYC	HOVAEELS VOLUMES WIDTHS LANES LANES LANES LANES LANES LANES LANES LANES LANES LANES LANES LANES LANES LANES LANES LANES ARRIVALITES ACTUATIONS ACTUATIONS ACTUATIONS STARTUPLOS: ENCRAIN STORACE INITIALQUEUE INITIALQUEUE INITIALQUEUE INITIALQUEUE INITIALQUEUE INITIALQUEUE ENCRAIN STORACE RACTORS BACTORS BACTORS BACTORS BACTORS BACTORS SATURATIONIFLORS SATURATIONIFLORS SATURATIONIFLORS SATURATIONIFLORS SATURATIONIFLORS SATURATIONIFLORS SATURATIONIFLORS SATURATIONIFLORS SATURATIONIFLORS	Phasing Parameters SEQUENCES FEBRISSIVES Y CYCLES CREENINGS CREENINGS 67.

Institute for Astronomy FM Peak Hour of Traffic Year 2005 with Phase 1	Institute for Astronomy FM Peak Hour of Traffic Year 2005 with Phase 1	12/26/03 08:49:41
SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary Intersection Avorages for Int # 0 - Haleakala Highway/Old Haleakal Degree of Saturation (v/c) 0.59 Vehicle Delay 13.8 Level of Service B+ Sq 11 Phase 1 Phase 2 ***/**	SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values Intersection Parameters for Int # 0 - Haleakala Highway MCIROAREA SIMULATION PERIOD 15 ILVELOFSERVICE C S NODELOCATION 0 0 QUEUTAODELS 1 90 25 40	of Parameter Values - Haleskala Highway/Old Haleskal
4+++; 4-++; 6/C#0.300 6/C	Parameters SB WB CO CO CO CO CO CO CO CO CO CO CO CO CO	NB EB OOO OOO OOO OOO OOO OOO OOO OOO OOO
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Institute for Astronomy AM Peak Hour of Traffic Year 2005 with Phase 1

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Intersection Parameters for Int # 0 - Haleakala Highway/Old Haleakal METROAREA NONCED 15 SIMULATION PERIOD 15 NODELOCRENVICE C S NODELOCATION 0 0 0 QUEUCHODELS 1 90 25 40 SIGNAL2000/TEAPACIVer 1.11.00] - Summary of Parameter Values

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summery Intersection Averages for Int # 0 - Haleakala Highway/Old Haleakal Degree of Saturation (v/c) 0.73 Vehicle Delay 8.4 Level o	nleskal Level of Service A	PAC[Ver n Param IOD	1.11.00] - Sum eters for Int # NONCED	mary of Paramet 0 - Haleakal	ī 3
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SIGNAL2000/TEAPAC(Ver 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - Haleskelm Highway/old Haleskel Degree of Saturation (v/c) 0.47 Vehicle Delay 7.7 Level of Service A

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SIGNAL2000/TEAPACIVer 1.11.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Haleakala Highway/Makani Road

Intersection Averages for Int # 0 - Haleakala Highway/Makani Road

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12/23/03 Institute for Astronomy 13:59:01 AM Peak Hour of Traffic Year 2005 with Phase 1	SIGNAL2000/TEAPAC(Ver 1.1 Intersection Parameter HETROANEA HONG 19701 PERIOD 1970101 PERIOD	LEVELOCATION 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Hovement Parameters HOVIABELS RT TH LT RT TH LT Ped= 0.0 sec = 0.0% VOLUMES 12.0 12.0 12.0 12.0 12.0 12.0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	25.000 Kg w	CUEUE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	42.9 D+ Phasing Parameters 16 16 16 16 16 16 16 1	9
Institute for Astronomy AM Peak Hour of Traffic Year 2005 with Phase 1	SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - Haleakala Highway/Makawao Aven Degree of Saturation (v/c) 0.66 Vehicle Delay 39.3 Level of	Phase 2 Phase 3	Y+R= 5.0" X+R= 5.0" OFF=42.2% OFF=51.1% 		Approach RT 12/1 0.293 0.456 623 721 306 0.424 TE 12/1 0.234 0.256 335 476 289 0.607 LT 12/1 0.315 0.256 217 323 300 0.920	Approach RT 12/1 0.128 0.367 451 581 11 0.019 TH 12/1 0.155 0.256 335 476 111 0.233 LT 12/1 0.157 0.256 111 171 33 0.180	Approach RT 12/1 0.295 0.433 546 686 289 0.421 TH 12/1 0.476 0.433 684 807 772 0.957 LT 12/1 0.120 0.056 1 80 6 0.061	Approach RT 12/1 0.132 0.522 112 827 17 0.021 RT 12/1 0.132 0.523 712 827 17 0.021

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Institute for Astronomy AM Peak Hour of Traffic Year 2005 with Phase 1	SIGNAL2000/TEAFAC(Ver 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - Kula Highway/Halsaka, Degree of Saturation (v/c) 0.79 Vehicle Delay 39.9	Sq 61 Phase 1 Phase 2 Phase 3 Phase 4	•••	`	↓ 1	+	g/c=0.078	X+X= 5.0"	OF7= 0.04
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08:54:35	mary	leakala Highway 22.2 Level of Service C+	<u>; </u>		PEDLEVELS BIKEVOLURES PARKINGSIDES	PANKOLUSTES BUSYDLUSTES RIGHTURNONREDS UPSTREAMYC	!	33,3% Padw 0.0 asc m 0.0% VOLUMES WIDTHS	v/c Delay S Hodel 1 UTILIZATIONS	23.2 C+	0.010 13.4 B+ 4 ft ACTUATIONS 0.748 23.0 cc+ 380 ft MINIMUMS 0.316 26.1 cc+ 44 ft SIANTUPLOST	20.9 C+ INTIALQUEUE	10.680 16.1 B 422 ft IDEALSAIFLONS 10.768 30.5 4c 259 ft DELAYFACTORS	NSTOPACTORS 27.4 C+ SATURATIONFLONS		
instruce for Astronomy PH Peak Hour of Traffic Year 2005 with Phase 1	SIGNAL2000/TEADAC[Ver 1.11.00] - Capacity Analysis Summary	Intersection Averages for Int # 0 - Kula Highway/Haleskala Highway Degree of Saturation (v/c) 0.68 Vehicle Delay 22.2 Level of	2q 61 Phase 1 Phase 2 Phase 3 Phase 4	***	Nozeh	G/C=0.100 G/C=0.050 G/C=0.367 G/C=0.150 G/C=0.301 G/C=0.150 G/C=	0.0% OFFw18.3% OFFw31.7% OFFw76.	Cm 60 sec Gm 40.0 sec m 66.74 %m20.0 sec m 33.			RT 12/1 0.027 0.367 501 581 6 0. TH 12/1 0.313 0.367 616 683 511 0. LT 12/1 0.056 0.100 118 169 56 0.	NB Approach	TH 12/1 0.376 0.500 879 931 633 0. LT 12/1 0.220 0.233 340 413 317 0.	reserved to the Approach	12/1 0.126 0.150 160 218 128	restriction of the state of the

Institute for Astronomy AM Peak Hour of Traffic Year 2005 with Phase 1

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Intersection Averages for Int # 0 - Old Haleakala Hwy/Pukalani St Degree of Saturation (v/c) 0.50 Vehicle Delay II.8 Levol of Service B+

SIGNAL2000/TEAPAC(Ver 1.11.00) - Capacity Analysis Summary

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Institute for Astronomy PM Peak Hour of Traffic Year 2005 with Phase 1
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Institute for Astronomy
AM Peak Hour of Traffic
Year 2005 with Phase 1 12/23/03 0 - Old Haleakala Highway/Makawao 0.54 Vehicle Delay 16.3 Level of Service

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Institute for Astronomy PM Peak Hour of Traffic Year 2005 with Phase 1	SIGNAL2000/TZAPAC[Ver 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - Old Haleakalm Highway/Makawao Degree of Saturation {v/c} 0.45 Vehicle Delay 14.2 Level of Service B+	Eq 0 Phase 1 Phase 2 Phase 3
12/23/03 14:26:23		NONE NONE 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.
ony 1.c 1.	SIGNAI2000/TEAFAC[Ver 1.11.00] - Summary of Parameter Values	18.00 10 NO NO IEADLAGS YES YES YES YES OFFSET 18.00 3.00 24.00 5.00 5.00 5.00 1 1 2 3 7 8 9 2 10 11 12 0 0 0 5 0 0 0 0 0 6 0 0 0 0 0 6 0 0 0 0 0 6 0 0 0 0
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EB Approach | 12/1 | 0.227 | 0.533 | 949 | 979 | 344 | 0.351 | 8.3 | A | 157 ft | 1 | 12/1 | 0.234 | 0.533 | 913 | 944 | 344 | 0.364 | 8.3 | A | 159 ft | WB Approach |RI+TE+1II| 12/1 |0.277 |0.400 | 622 | 676 | 400 |0.592 | 15.5 |*B | 251 £t| NB Approach |RIT+IH+LIT| 12/1 |0.108 |0.300 | 441 | 506 | 122 |0.241 | 16.1 | B | 74 ft|

SB Approach | 12/1 | 0.245 | 0.300 | 395 | 475 | 300 | 0.632 | 24.4 | C+| 219 ft| | TH+LT| 12/1 | 0.120 | 0.300 | 389 | 452 | 122 | 0.270 | 16.3 | *B | 75 ft|

| Lane | | Hidth/| 9/C | Service Rate| Adj | | HC* | L | Queue | | Group | Lanes| Reqd Used | 8C (vph) 0E | Volume| v/c | Delay | S |Hodel 1|

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Intersection Parameter for Int # 0 - Old Heleskels Highway/Makawa SIGNALZONO/TEARNE(Wer 1.11.00) - Surmary of Parameter for Int # 0 - Old Heleskels Highway/Makawa SIGNALZONO/TEARNE(Wer 1.11.00) - Surmary of Parameter for Int # 0 - Old Heleskels Highway/Makawa SIGNALZONO/TEARNE(Wer 1.11.00) - Signal Highway/Makawa SIGNALZONO/TEARNE(Wer 1.11.00) - SIGNA														YA Peak Hour or Trait Year 2005 with Phase
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SIGNALZOUG/TEAFACTVRE 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - Kula Hwy/A.Apuso Pkwy Degree of Saturation (v/c) 0.58 Vehicle Delay 13.6 Level of Service B+	Int # 0	or faitheath values - Kula Hwy/A'Apuso Pkwy	
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APPENDIX C LEVEL OF SERVICE CALCULATIONS

• Base Year 2006

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Institute for Astronomy. AN Peak Hour of Traffic Base Year 2006 with traffic signal

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0 - Haleskala Highway/Old Haleskal

- Summary of Parameter Values Intersection Parameters for Interpretationer, NONCED 15 EMPLATION PERIOD C S INDELCATION 0 0 0 QUEUCATION 1 90 25 40 SIGNAL2000/TEAPAC[Ver 1.11.00] 88 0.0 0.0 0.0 0.00 HOVLABELS

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RIGHTUNKNINGSI Intersection Averages for Int # 0 - Haleskalm Highway/Old Haleskal Degree of Saturation (v/c) 1.24 Vehicle Delay 214.6 Level of Service SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary Institute for Astronomy AM Peak Hour of Traffic Base Year 2006 with traffic signal

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Institute for Astronomy FM Peak Hour of Traffic Base Year 2006 with traffic signal

SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - Haleskala Highway/Old Heleakal
Degree of Saturation (v/c) 0.72 Vehicle Delay 22.5 Level of Service C+

 	G/C=0.318 G/C=0.571 G= 28.6" G= 51.4" Y+Rs 5.0" Y+Rs 5.0" OFF= 0.0% OFF=37.3%	
	G/C=0.318 G= 28.6" Y+R= 5.0" OFF= 0.0%	
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3 6	•	Lane Hidth/ g/C Service Rate Adj ECK L Queue Grown Lane Rend India Grown Lane Rend R Made 1	7		6	٥	7	100	7.2	3 2	E E	5	<u>5</u>	Ì	\$		Inne Hidth/ 9/C Service Rate Adj RCK I Queue Group Innes Rad In Queue Group Rate Adj	==	1 -=	8	-
*	NB Approach	NB Approach 32.7 C												.		. <u>i</u>	32.7 C				
	5	LT 12/1 0.306 0.318 440 562 417 0.742 32.7 *C 439 £t	-	0.30	9	0.3	18		\$	_:	562	_ :	427	0	742	_ [32.7	-	<u>.</u>	439	핍
B Aş	WB Approach	d.															30.2 C		ri .		
	2	TB 12/1 0.551 0.571 972 1064 928 0.872 30.2 *C 974 £t	[-	0.55	<u> </u>	0.5	7	_ [972		790	 	928 828	9	872	_ [30.2	-	- 1	24	끏
2	EB Approach	5															12.8 B+		*		
["	H	TH 24/2 0.372 0.571 1988 2022 1178 0.583 12.8 B+ 452 ft	2	0.3	7	0.5	7	<u> </u>	988		022	1	178	2	583	-	12.8	_	ŧ	452	4

Base Year 2006 with traffic signal signal signal signal-	leh traffic S[Ver 1,11,	#1gn#1 00] - Su	il Summary of Parameter Values	Parag	6 10 10	Value	_			
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Averages for Int # 0 - Haleskala Highway/Old Heleskal of Saturation (v/c) 0.77 Vehicle Delay 10.3 Level of Service B+ SIGNAL2000/TEAPAC(Ver 1.11.00) - Capacity Analysis Summary Intersection Averages for Int # 0 - Haleskala Highway/Old Degree of Saturation (v/c) 0.77 Vehicle Delay 10.3

				1 D
				Y=10.0 sec
				86.98
Phase 2	*	-	G/C=0.167 G= 15.0* X+R= 5.0* OFF#77.8%	G* 80.0 sec =
Phase 1 Phase 2	*	***	G/C=0.722 G= 65.0" Y+R= 5.0" OFF= 0.0%	06 90
o bs	·÷·	North	•	

G* 80.0 sec = 88.9% Yalo.0 sec = 11.1% Pedm 0.0 sec = 0.0%

1 !	Group Lanes Reqd Used @C (vph) @E Volume v/c Delay B Model 1	Group Lanes Reqd GC (vph) @E Volume v/c Delay S Model 1		Redd	֡֞֞֓֞֓֞֟֓֓֓֓֓֟֝֓֓֓֟֝֟֓֓֓֓֓֓֟֡֓֓֓֓֡֡֡֡֡֡֝	Jsed	5	2	Ê	8	.ĕ į		- <u>-</u>	>	į	Vallay.	!	-Ξ¦	ę,	7
凸	NB Approach	년												i	i	9.5 A	~			
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EB Approach

0 - Haleakala Highway/Old Haleakal SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values NONE 20 AB 0.00 0.00 0.00 0.00 0.00 0.00 Intersection Parameters for Int #
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Institute for Astronomy AM Peak Hour of Traffic Base Year 2006 with traffic signal

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Institute for Astronomy PM Peak Hour of Traffic Base Year 2005 with traffic signal

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Institute for Astronomy
AM Peak Hour of Traffic
Base Year 2006 with traffic signal
SIGNAL2000/TEAPAC[Ver 1,11.00] - Summary of Parameter Values

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	SIGHALZOOO/TEAPAC [1	Paranet	EXCESS PRASE-COVERINES PRASE-C

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Intersection Averages for Int # 0 - Heleakele Highway/Old Heleakel Degree of Saturation $\{v/c\}$ 0.58 Vehicle Delay 11.5 Level of Service B+ SIGNAL2000/TEAPACIVer 1.11.00] - Capacity Analysis Summary

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G= 80.0 sec = 68.9% X=10.0 sec = 11.1% Ped= 0.0 sec = 0.0% C= 90 sec

		t wroup Lanes Radd Used QC (vph) &E Volume v/c Dalay S Model 1
NB Approach	16	31.9 C
LT 12/1 0.306 0.322 450 570 417 0.732 31.9 *C 435 £t	70 417 0.732 31.	.9 *C 435 £E
ИВ Аррголей	.0	0.2 A
TH 12/1 0.551 1.000 1863 1863 928 0.498 0.2 ** 44 0+1	163 928 0.498 0.	2 1 1 4 4

13:1 B+ | TH | 24/2 |0.372 |0.567 | 1970 | 2006 | 1178 |0.587 | 13.1 | B+| 456 ft|

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0 - Halenkala Highway/Old Haleakal

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SIGNAL2000/TLAPAC[Ver 1.11.00] - Summary of Parameter Values

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - Haleakala Highway/Makani Road Degree of Saturation (v/c) 0.74 Vehicle Delay 41.2 Level of Service D+	[Ver 1.11.00] arameters for NONCED	Yasaay	of Parameter Values - Heleskala Highway/Wakani Road	ani Road
Sq 11 Phase 1 Phase 2	SIMULATION PERIOD 15 LEVELOPSERVICE C S NODELOCATION 0 D QUEUZANDELS 1 90 25 40			
	Parameters (HB 0.0 0 0 0 0 NONZ	an o o o o o o o o o o	28 0.0 0 0 0 0
G/C=0.256 G/C=0.633 G= 23.0" G= 57.0" Y+R= 5.0" Y+R= 5.0" OFF= 0.0% OFF=31.1%		0.00	0°.00	0.000
Cm 90 sec Gm 80.0 sec m 88.9% Ym10.0 sec w 11.1% Padm 0.0 sec m 0.0%	ement Parameters RLS RT S 360	RT TH LT 50 990 20	RT TH LT 95 90 15	
Lane Width/ g/C Service Rate Adj HCK L Queue Group Lanes Redd Used @C (vph) @E Volume v/c Delay S Hodel 1	12.0 12.0 0.0 1 1 0 NORW NORW NORW 0.00 0.00 0.00	12.0 70.4 0.00	12.0 20.00 0.00	
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U	,,,	,,, ,,,	2.0 0.0 0.0 0.0	44
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NT+TE 12/1 0.664 0.633 1093 1171 1156 0.987 46.8 *D 1410 £t LT 12/1 0.136 0.633 543 612 22 0.036 9.1 A 16 £t	meters 11 11		•	
ZB Approach 7.4 A	PENGESIVES NO NO COLEMBE NES CECES NES CECES 90 180	NO NO YES YES	LEADLAGS OFFSET PENTING	NONE 0.00
RI+TH 24/2 0.187 0.633 2232 2236 395 0.177 6.9 A 103 ft LT 12/1 0.225 0.633 59 75 30 0.477 30 1.1 30 4.1	INCS 23.00	1		3

Institute for Astronomy PM Peek Hour of Treffic	Base Year 2006	

01/07/04 08:33:11

SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

Institute for Astronomy PM Peak Hour of Traffic Base Year 2006

01/07/04 08:33:03

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SIGNAL2000/TZAFAC[Ver 1.11.00] - Capacity Analysis Summary

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G/C=0.700 G= 63.0" Y+R= 5.0"	
C= 80.0 sec = 88.9% Y=10.0 sec = 11.1% Ped= 0.0 sec =	11 Pedm 0.0 sec m 0.0%
	v/c Delay 5 Model
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	31.5 C
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0 - Kula Highway/Haleakala Highway

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values Base Year 2006 Institute for Astronomy
PH Peak Hour of Traffic
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Base Year 2006
SIGNAL2000/TZAPAC[Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - Kulm Highway/Haleakalm Highway
Degree of Saturation (v/c) 0.83 Vehicle Delay 41.2 Level of Service Degree of Saturation (v/c)

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Institute for Astronomy AM Peak Hour of Traffic Base Year 2006

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - old Haleskala Hwy/Pukalani St
Degree of Saturation (v/c) 0.57 Vehicle Delay 16.9 Level of Service B

Sq 0 Phase 1 Phase 2 Phase 3	**	*	0/0-0.0	X+X= 5.0"
Phase 1		***	G/C=0,450	T+R= 5.0"

Cm 60 sec Gm 50:0 sec m 83.3% Y=10.0 sec m 16.7% Pedm 0.0 sec m 0.0%

_ i	Group Lanes Reqd Used 8C (vph) 8E Volume v/c Delay S Model 1	- [Lanes	2	Ţ	Deed	-	8	Ę.		-	701 Line		2	r A	2	1 00	2	7	a i
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£	MB Approach	5													7	24.1 C+	ŭ			1

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8	EB Approach	뒫								ZB Approach	8.8	<	İ	}	
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SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

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SIGNAI2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

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Institute for Astronomy PM Peak Hour of Traffic Base Year 2006

SIGNAL2000/TEAPACIVer 1.11.00] - Capacity Analysis Summary

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Intersection Averages for int # 0 - old Haleskels Hwy/Pukalani St Degree of Saturation (v/c) 0.65 Vehicle Delay 21.4 Lovol of Service C+

| G/C=0.217 | G/C=0.083 | G/C=0.533 | | G/C=0.217 | G/C=0.083 | G/C=0.533 | | G/C=0.217 | G/C=0.083 | G/C=0.07 | | Y-R= 5.07 | Y-R= 5.07 | Y-R= 0.07 | | Y-R= 0.08 | OFF=4.6.74 | | OFF= 0.08 | OFF=4.6.74 | | OFF= 0.08 | OFF=4.083.34 | Y=10.0 sec = 16.74 | Fod= 0.0 sec = 0.08 aq o | Thass 1 | Thase 2 | Thase 3 | *** ₩orth MOXI I

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Lane [Midth/] g/C | Service Rate| Adj | | HCH | L | Queue | Group | Lanes| Redd Used | BC (vph) 6E |Volume| v/c | Delay | S |Hodel 1| NB Approach

37.0 |*D+| 558 ft| 25.3 |*C+| 347 £t| 34.8 | C | 261 £t| 28.3 TH 12/1 | 0.161 | 0.617 | 1136 | 1149 | 228 | 0.198 | | LT | 12/1 | 0.086 | 0.083 | 606 | 637 | 611 | 0.959 | | RT | 12/1 |0.341 |0.383 | 541 | 607 | 467 |0.769 | LT | 12/1 |0.216 |0.217 | 312 | 383 | 311 |0.812 WB Approach 抗

EB Approach

| 12/1 |0.370 |0.750 | 1188 | 1188 | 517 |0.435 | 3.9 | A | 172 ft| | 12/1 |0.179 |0.450 | 793 | 838 | 261 |0.311 | 10.8 | B+| 132 ft|

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

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Institute for Astronomy AM Peak Hour of Traffic Base Year 2006

SIGNNL2000/TEARAG[Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - Old Haleakala Highway/Makawao
Degree of Saturation (v/c) 0.59 Vehicle Delay 17.2 Level of Service B

Institute for Astronomy AM Peak Hour of Traffic Base Year 2006

0 - 01d Haleskala Highway/Hakawao SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values Intersection Parameters for Int # HETROAREA NONCED 15
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Institute for Astronomy AM Peak Hour of Traffic Base Year 2006

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary

Intersection Averages for int # 0 - Old Haleakala Highway/Makawao Degree of Saturation (v/c) 0.62 Vehicle Delay 21.3 Level of Service C+

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

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Phase 2		_		< _	***	<u> </u>	<u> </u>	>	G/C=0.050	3.0"	Y+R= 5.0"	OFF-38.34	
Phase 1 Phase 2	i	* * + <u>-</u>	^ • <u>*</u>	>	< _	++	+++	+ + +	1 G/C=0.300	-6-18.0"	T+R= 5.0"	OTF- 0.04	Section 2 and 2 an
Sq 0		•	=	_	-	Worth	_						

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C= 60 sec G= 45.0 sec = 75.0% X=15.0 sec = 25.0% Pad= 0.0 sec = 0.0% | Lane | Width/| g/C | Service Rate| Ad) | | HG4 | L | Queue | | Group | Lanss| Reqd Used | @C (vph) @E | Volume | v/c | Delay | S | Model 1|

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EB Approach 8.7 A	ch.													60	8.7 A	~		
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CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

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Institute for Astronomy PM Pesk Hour of Traffic Base Year 2006 with traffic signal and Halekala Highway widen

01/07/04

SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - Haleskala Highway/Old Heleskal
Degree of Saturation (v/c) 0.65 Vehicle Delay 14.9 Level of Service B+

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Phase 1 Phase 2	***	g/C=0.367 C= 22.0" Y+R= 5.0" OFF= 0.0%
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Institute for Astronomy PM Peak Hour of Traffic Base Year 2006 with traffic si SIGNAL2000/TEAPAC[Ver 1.11.00] Intersection Parameters for HZTROAREA	TYNOS TO SEE STAN	HOVLEELS VOLUES VOLUES VOLUES VOLUES LANES	Phasing Parameters significances remines to overland overland overland of the control of the con

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Institute for Astronomy AM Peak Hour of Traffic Base Year 2006 with traffic signal and Heleakala Highway wide

SIGNAL2000/TEAPAC(Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - Haleskala Highway/old Haleskal
Degree of Saturation (V/c) 0.56 Vehicle Delay B.8 Level of Service A

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Phase 2	•	‡	G/C=0.178 G= 16.0" Y+R= 5.0" OFT=76.7%
Phase 1 Phase 2	*	***	G/C=0.711 G= 64.0" X+R= 5.0" OFT= 0.04
Sq 0	·<-	North Horth	·

90 sec G= 80.0 sec = 88.9% Y=10.0 sec = 11.1% Red= 0.0 sec = 0.0% å

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01/07/04 Institute for Astronomy AM Peak Hour of Traffic Base Year 2006 with traffic signal and Haleskala Highway wide

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Institute for Astronomy
AM Peak Hour of Traffic
Base Year 2006 with traffic signal and Heleskals Highway wide

SIGNAL2000/TEAPACIVer 1.11.00] - Summary of Parameter Values

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Institute for Astronomy PH Peak Hour of Traffic Base Year 2006 with traffic signal and Haleakala Highway wide

01/07/04 15:51:48 SIGNAL2000/TEAPAC(Ver 1.11.00) - Capacity Analysis Summary Intersection Averages for Int # 0 - Haleskals Highway/Old Haleskal Degree of Saturation (v/c) 0.52 Vehicle Delay 9.2 Level of Service A

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Institute for Astronomy	PM Peak Hour of Traffic

01/07/04 15:52:03

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SIGNAL2000/TEAPACIVer 1.11.00] - Summary of Parameter Values

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Institute for Astronomy PM Peak Hour of Traffic Base Year 2006 with traffic signal and Haleskala Highway wide	Cid Cid Craff	to sta	nal and	Haleakala Hig	ghesy wide	01/ 15:	01/07/04 15:52:03
SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values	₹ 1.1	1.00]	- Summar	y of Paramet	er Values		
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HCS2000: Ramps and Ramp Junctions Release 4.1d

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-		Fax:
Tara Lucas	501 Summer Street Suite 521	Honolulu, mewall 9001. Phone: (808)533-3646 E-mail: atahnl@atahawail.com

Merge Analysis	TL 1/17004 1/17004 1/170004 1/170000 1/17000000 1/17000000000000000
H	Analyst: Agency/Co.: Agency/Co.: Date performed: 1/8/2004 Analysis time period: Ay peak Freeway/Dir of Travel: Heleskala High Junction: Austrofton: Analysis Year: Description: Institute for Astronomy

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Conversion to pc/h Under Base Conditions_ Junction Components Freeway Ramp Volume, V (vph) Peak Linn volume, v15 Peak 15-min volume, v15 Trucks and buses Terrain type: Carde Length Trucks and buses PCE, ET Trucks and buses PCE, ET Heavy vahicle adjustment, fftv Peak 1.2 Loop Terrain type: Level And Peak 1.2 Level And And Peak 1.2 Level And And Peak 1.3 Trucks and buses PCE, ET Trucks and b	Freeway 1360 0.90 378 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Conditions Ramp 840 0.90 233 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Adjacent Remp vph vph mi mi mi
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(Equation 25-2 or 25-3)

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Capacity Checks_

Actual Maximum 108 F7 2444 4500 No	2625 4 600 No	Level of Service Determination (if not F)	Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 21.0 pc/m1/ln	R R Tarel of service for ramp-freeway junction areas of influence C	Speed Estimation	speed variable, H = 0.340	luence area, S	peed in outer lanes, S = N/A mph	man and for all vehicles.
Þ	FO V R12	Leve	Density, D = 5.475 +	R Level of service for		Intermediate speed variable,	Space mean speed in	Space mean speed in outer lanes,	Total Control of the

MCS2000: Ramps and Ramp Junctions Release 4,1d

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		1	Fax:
Tara Lucas ATA	501 Summer Street Suite 521	Honolulu, Hawaii 96817	1: atahnle

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Analys	Way/wes western with w
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Does adjacent ramp exist? Volume on adjacent Ramp Position of adjacent Ramp Type of adjacent Ramp Distance to adjacent Ramp

Estimation of V12 Herge Areas (Equation 25-2 or 25-3)

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	LOS F7 No	80 82
Checks	Maximum 4500	4600
Capacity Checks	Actual 1345	1456
	£	A12

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 12.6 pc/mi/ln R 12 A Level of service for ramp-freeway junction areas of influence B

	qda	udu	ud:
Н - 0.303	5 = 51.1	S = 14/A	s = 51.1
Intermediate speed variable,	Space mean speed in ramp influence area,	Space mean append in outer lanes,	Space mean speed for all vehicles,

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Institute for Astronomy AM Pesk Hour of Traffic Base Year 2006 with Halekala Highway widening

1 84 £t| | 86 £t| 24.0 |+C+| 359 ft| 18.4 | B | 195 ft| G= 80.0 sec = 88.9% Y=10.0 sec = 11.1% Pad= 0.0 sec = 0.0% | MCH | L | Queue | | Delay | S | Model 11 Averages for Int # 0 - Haleskala Highway/Makani Road of Sarvice C+ of Saturation (v/c) 0.52 Vahicle Delay 21.2 Level of Sarvice C+ 16.6 | B | 400 |0.598 | | 239 |0.394 | SIGNAI2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - Halemkala Highway/Hel Degree of Saturation (v/c) 0.52 Vehicle Delay 21.2 | G/C=0.467 | G= 42.0" | Y+R= 5.0" | OFF=47.8% | G/C=0.422 | G | G/C=0.422 | G | X+R= 5.0" | N | Offs= 0.0% | C

000000 - Haleskels Highway/Makani 0000 SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values 25 X Halekala Highway widening Intersection Parameters for Int # ROANEA NONCED NONCED 15 360 100 115 12.0 12.0 0.0 12.0 12.0 0.0 10.0 0.0 0.00 2.0 2.0 2.0 2.0 2.0 2.0 3 3 3 3 METROANEA NONCED 15 SIMULATION PERIOD C 15 LEVELOCATION C C 0 OUTUTACONELS 1 90 25 40 SB NOWE 200 0.00 0.00 0.00 Approach Parameters
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L2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary

0 - Haleskala Highway/Makani Road 0.39 Vehicle Delay 8.1 Level of Service

Institute for Astronomy
PM Peak Hour of Traffic
Base Year 2006 with Halekala Highway widening
SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysi
Intersection Averages for Int # 0 - Haleskala B
Degree of Saturation (V/C) 0.39 Vehicle Degree of Saturation (V/C) 0.39 Vehicle Degree of Saturation (V/C) 0.40 Vehicle Degree of Satu G/C=0.167 | G/C=0.667 G= 10.0" | G= 40.0" X+R= 5.0" | Y+R= 5.0" OFF= 0.0% | OFF=25.0%

0.04 * Ped= 0.0 sec Gm 50.0 sec m 83.3% Ym10.0 sec m 16.7% C= 60 sec

| MCK | L | Scwoe | | Delay | S | Model 1| 24 tt ## ft 5.1 A 4.7 | A | 191 E 6.9 | A | 85 E 242 16 25 22 68 ---±± ţ < < ~ 25.9 22 0 22 6 7.0 5.7 v/c 10.306 10.356 10.280 10.381 0.415

Institute for Astronomy PM Peak Hour of Traffic Base Year 2006 with Halekala Highway widening

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SIGNAL2000/TEAPACIVer 1.11.00] - Summary of Paramoter Values

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Institute for Astronomy AM Peak Hour of Traffic Base Tear 2006 with Halekala Highway widening	SIGNAL2000/TEAPAC[Ver 1.11.00] - Si Intersection Parameters for Int METROAREA SIMULATION PERIOD 15 ************************************	HODELOCATION QUEUEMODELS 1	Approach Parameters APPLABILS	PEDLEVELS BIKEVOLUMES PARKINGSIDES PARKVOLUMES	BOSYDLWHES RIGHTTURNONREDS UPSTREAMYC	HOVIABELS Parameters HOVIABELS 280	WIDTES LANTS CROUPTYPES UTILIEATIONS TRUCKPERCENTS	PEAKHOURIACTORS ABRIVALITERS ACTUATIONS	REQUIRARANCES HINDHOMS STARTUPLOST ENGGAIN	STORAGE INITIALQUEUE IDPALSATILOMS	FACTORS DELATFACTORS NSTOPFACTORS SATURATIONFLOWS	Phasing Parameters	PERMISSIVES OVERLAPS CYCLES GREENTHAS	TELLOWINGS
01/07/04 15:35:50	Service C	Phase 6	, † ;	 	3/C=0.267 5- 24.0"	X+R= 5.0" OFF=67.8%	: 5 5 i	Ü	B 230 ft C 381 ft iD+ 381 ft	Ω	0+ 11 ft +D 176 ft +D+ 46 ft	Ü	B 248 £t *D+ 525 £t *D+ 7 £t	
01/07/04 15:35:50	kawao Aven Lavel of Service	hase 5 P	, ‡;	<u>‡</u> ‡_	0 0 0	FEEST.8% OFFEEST.	HCK L Qui	30.8 C	1 15.5 B 230 33.3 C 381 42.7 *D+ 381	45.7 D	26.8 C+ 11 48.3 +D 176 41.7 +D+ 46	34.8 C	1 15.5 B 248 41.8 +D+ 525 39.5 +D+ 7	
01/07/04 15:35:50	kawao Aven Lavel of Service	4 Phase 5 P	 + • • •	\$ \$\frac{1}{2} \tag{2}	7 0/0=0.044 0/0	FEEST.8% OFFEEST.	NO T NOW T On	30.8	B 230 C 381 *D+ 381		C+ 11 +D 176 +D+ 46		300 0.341 15.5 B 248 822 0.871 41.8 *D+ 525 6 0.051 39.5 *D+ 7	
	lysis Summary la Highway/Makawao Aven e Delay 33.3 Level of Service	4 Phase 5 P	 + • • •	` <u> </u>	G/C=0.067 G/C=0.044 G/C=1 G= 4.0" G=	T+RM 5.0" X+RM 5.0" X+RM 5.0" OFFMET 5.	NO T NOW T On	30.8	10.393 15.5 B 230 10.698 33.3 C 381 10.794 42.7 D+ 381		0.030 26.8 C+ 11 0.696 48.3 4D 176 0.331 41.7 40+ 46		10.341 15.5 B 248 10.871 41.8 +D+ 525 10.051 39.5 +D+ 7	
skala Highway widening	lysis Summary la Highway/Makawao Aven e Delay 33.3 Level of Service	3 Phase 4 Phase 5 P	+++++++++++++++++++++++++++++++++++++++	^ + + + + + + + + + + + + + + + + + + +	G/Cm0.111 G/Cm0.067 G/Cm0.044 G/Cm0.04	7+Rm 5.0" 1+Rm 5.0" X+Rm 5.0" X+Rm 5.0" OFF=67.	9/C Service Rate Adj ECK L Qui g/C Service Rate Adj ECK L Qui g/C G (vph) @E Volume v/c Delay S Hod	30.8	0.500 709 792 311 0.393 15.5 B 230 10.278 381 517 361 0.698 33.3 C 381 0.233 272 413 328 0.794 42.7 0.000 381 38				10.556	
01/07/04 AM Peak Hour of Traffic Base Year 2006 with Halekala Highway widening	lysis Summary la Highway/Makawao Aven e Delay 33.3 Level of Service	2 Phase 3 Phase 4 Phase 5 P	++++	**************************************	#0,067 G/C=0.111 G/C=0.111 G/C=0.067 G/C=0.044 G/C=0.067 G/C=0.044 G/C=0.067 G=0.044 G/C=0.067 G=0.044 G/C=0.067 G=0.044 G/C	# 148 5.0" 148 5.0"	sec = 66.7% Y=30.0 sec = 53.3% fec c; C c; C c c c c c c c c c c c c c c	30.8	12/1 0.296 0.500 709 792 311 0.393 15.5 B 230 12/1 0.268 0.278 381 517 361 0.698 33.3 C 381 517 0.598 0.794 42.7 0.541 381 512/1 0.262 0.233 272 413 328 0.794 42.7 0.541 381		12/1 0.128 0.233 189 368 11 0.030 26.8 C+ 11 12/1 0.166 0.111 1 190 144 0.696 48.3 **D 176 12/1 0.132 0.067 1 99 39 0.331 41.7 **D+ 46		12/1 0.301 0.556 774 880 300 0.341 15.5 B 248 24/2 0.295 0.267 710 944 822 0.871 41.8 PD+ 525 10.295 0.267 1 99 6 0.051 39.5 PD+ 7	

| Lane | Width/|
| Group | Lanes | Ra
SB Approach
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| 12/1 |0.169 |0.489 | 24/2 |0.169 |0.367 | 12/1 |0.214 |0.167

NOX FIG.

Institute for Astronomy PH Pesk Hour of Traffic Base Year 2006 with Halekala Highway widoning

01/07/04

SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - Haleskala Highway/Hakawao Aven
Degree of Saturation (v/c) 0.68 Vehicle Delay 49.2 Level of Service D

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North	:	_	•	7	<u> </u>	\ \
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	G/C=0.075	G/C=0.017	G/C=0.350	1 G/C=0.042	G/C=0.075 G/C=0.017 G/C=0.350 G/C=0.042 G/C=0.075 G/C=0.075	70,000
	9.0	- 2.0"	6- 42.0"	.0.0		23.01
	X+R= 5.0"	1 X+N= 5.0"	T+X# 5.0"	X+N= 5.0"	X+72 5.0"	X+R= 5.0"
_	0.01 - 0.01	OFF-11.74	077-17.54	OFF=56.74	077=65.04	1 OFF#76.74

### Approach RT 12/1 0.301 0.608 879 963 172 0.179 10.7 B+ 127 E+ 127 10.333 0.408 880 761 372 0.489 26.7 C+ 409 E+ 127 10.333 0.408 880 761 372 0.489 26.7 C+ 409 E+ 127 E+ 127 10.245 0.433 803 686 22 0.032 19.6 B 23 E+ 127 E+ 127 10.245 0.433 803 686 22 0.032 19.6 B 23 E+ 127 10.245 0.075 1 10.55 10.075 1 10.55 10.075 1 10.55 10.075 1 10.55 10.075 1 10.57 10.5		Group	Width/ Lanes	/! g/c	2	D G	!	Service Rate! Adj 8C (vph) 8E [Volume	€ E	4 th	Volum		٧/د		HCM Delay	—— H m	Oueue Hodel 1	
12/1 0.301 0.608 879 963 172 0.179 10.7 B+ 127 12/1 0.333 0.408 580 761 372 0.489 26.7 C+ 409 25/1 0.333 0.408 580 761 372 0.489 26.7 C+ 409 26/2 E+ 205 28/2 0.133 0.407 22/3 0.407 26/3 E+ 205 22/4 0.245 0.433 503 686 22 0.032 19.6 B 23 12/1 0.245 0.350 422 652 617 0.946 60.8 *x+ 362 12/1 0.258 0.075 1 10.5 1	8	Appro	ę,						'	'				Í	32.6	υ		
12/1 0.245 0.433 503 686 22 0.032 19.6 B 23 12/1 0.423 0.350 422 652 617 10.946 60.8 *** 147 10.245 0.075 1 1 10.5 89 0.669 66.3 *** 147		본목점	12/1			133 133 133		679 580	0 - 4	828	172 372 183		2179 2175	!	10.7 26.7 65.2	***		222
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12/1 0.373 0.367 274 581 289 0.497 35.7 D+ 368 12/1 0.252 0.042 1 51 1 0.149 56.4 *E+ 18 1 0.252 0.042 1 5 1 5 1 0.149 56.4 *E+ 18 1 0.340 0.425 408 673 211 0.314 27.7 C 251 24/2 0.326 0.308 419 1091 539 0.494 36.5 D+ 374 12/1 0.320 0.158 1 254 239 0.654 70.9 *E 397 397	i		12/1 12/1 12/1			433 350 075		503 422 1	997	828	617 617 89	g i	032 946 669		19.6 60.8 66.3	a * * *	I :	222
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43.0 D+ 12/1 0.340 0.425 408 673 211 0.314 27.7 C 251 24/2 0.326 0.308 419 1091 539 0.494 36.5 D+ 374 12/1 0.320 0.158 1 254 239 0.854 70.9 *E 397	i	222	12/1			367		274	100	828	289 644 11		282 202	I !	35.7 71.1 56.4	<u> </u>	368 587 18	###
12/1 0.340 0.425 408 673 211 0.314 27.7 C 251 24/2 0.326 0.308 419 1091 539 0.494 36.5 D+ 374 12/1 0.320 0.158 1 254 239 0.854 70.9 *E 397	8	λρρεοι	ų				1								43.0	Å		
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56 NO NO YES YES 120 90 2.00 42.00 5.00 5.00

Phasing Parameters 56 PERHISSIVES NO CVERLAPS 128 GREWINES 9,00 PELLOWINES 5,00 EXCESS 0

Institute for Astronomy PM Peak Hour of Traffio Base Year 2006 with Halekala Highway widening

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SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

NODELOCATION QUEUEMODELS 1	LEVELOFSERVICE C NODELOCATION 0 QUEUTHODELS 1 90 2	25 E	w ~ ~ ~									
Approach Parameters	netera	_										
APPLABELS		£15			5			5			å	
GRADES		0,0			0						3 6	
PEDLEVELS					;			•			;	
BIKEVOLINES		• •			•			> <			> (
DESCRIPTION		2			2			7			ا ٥	
		300			200			NONE			NONE	
PAKKYOLUHES		2			2			20			20	
BUSVOLUMES		0			0			٥			0	
RIGHTTURNONNEDS		0			0			C			· c	
UPSTREAMYC		0.00			0.0			0.00			0.00	
Movement Parameter	Beters	_										
HOVIABELS	멅	E	ដ				R	H		E E		H
volumes	155	335	165				20	555		190		215
MIDTHS	12.0	12.0	12.0	12.0	24.0	12.0	12.0	12.0	12.0	12.0	24.0	12.0
CORES		-					-			-		-
ROUPTYPES	KOK	KOK		NOR	NOXH	XOX XX	XO KO	NOK	NOX	NORON	NORON	NO EX
JTILIZATIONS	0.0	0.00	0.00	0.00			0.0			0		00
FRUCKPERCENTS	5. 5.	7 0		9			2.0			2.0		2.0
PEAKHOURFACTORS	9.90	0.0		0.0	0.30	0.00	0	06.0	06.0	0.00	06	6
ARRIVALTIPES	n	m	n	71			n			~		
ACTUATIONS	오	123	17.3	2			2		XES	2	>	Y
REQUIEARANCES	s. 0	0.0	8.0	5.0			9		5.0	5.0		
KINDUMS	5	9	50	5.0			S.		0	L		
BIARTUPLOST	2.0	7	2	2.0	2.0	2.0	2	2.0	2	2	6	
SHOGATH	2,0	7.0	7	2.0			2.0		0			
STORAGE	0	٥	0	0					;	i		;
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DEALSATITIONS	1900	1900	100	1 000	100	100	000	2	,	9	9	
80000							2 6			2		
	3 6						1.00			1.00		
LELAT FACTORS	3	1.00					1.00			3		
STOPFACTORS	1.00	7.00	8	1.00	9	2.00	1.00	1.00	 80:T	08	1.00	1.00
ATURATIONFIONS												

Instit PM Per Base	Institute for Astronomy PM Peak Hour of Traffic Base Year 2006	ronomy					15	01/07/04 15:55:38	Institute for Astronomy PM Peak Hour of Traffic Base Year 2006	tronomy Traffic				01/0	01/07/04 15:55:51
BICHY	2000/TEAPAC	SIGNAL2000/TEAPAC[Ver 1.11.00]	•	Capacity Analysis Summary	Stammery				100 ft 1 Management 1100 ft 1 100	00 tt 1 1 100	1				
Inter	metion Avera Degree of Sa	Intersection Averages for Int # Degree of Saturation (v/c)		0 - Kulm Highway/Haleskalm Highway 0.80 Vahicle Delay 44.6 Level of	Haleskala / 44.6]	Highwa	ž,	rvice D+	Intersection Parameters for METROAREA	Parameters fo	Ä	0 - Kula	or sarateter various - Kula Highway/Haleakala Highway	la Highway	
3q 61	Phase 1	Phase 2	Phase 3	Phase 4	-				SIMULATION PERIOD LEVELOFSERVICE NODELOCATION	មួយ ប្រ					
· 			* * * * * * * *						QUEUTAGOELS 1 Approach Para	55		5	5	p B	
North -	* + +	· + + + • • •	· + + +	٨					Grades Pedlevels Birevolumes Parkingsides	NONG O	4	o o o non	o o o	o.o o.o sron	
	G/C=0.058 G= 7.0" Y+R= 5.0" OFF= 0.0%	i	G/C=0.417 G= 50.0" I+R= 5.0" OFF=34.2%	G/C=0.158 G= 19.0" Y+R= 5.0" OFF=80.0%					PARKVOLDAGS BUSYOLDAGS RIGHTUNONREDS UPSTREAMVO	0 00 0	5	0.000	20 0 0 0 0 0 0	0.000	
	C=120 Bec	Ge100.0 sac	= 83.3% Y=2	Y=20.0 sac = 16.7%		Pad= 0.0 sec	E D •	0.0	MOVEMENT PATRECTS MOVINGES ST VOLUMINS	TH 640		TH LT 80 70	RT TH LT 55 790 430	RT TH	
Lan	Kideh/ Lanes	g/c Regd Used	Service Ru 8C (vph) 8	Service Rate Add (C (vph) &E Volume	- o/w	BOH Delay	18 70 70 70	Queue Model 1	WIDIHS LANES GROUPITES HETT TENETONS		12.0 FFLH		12.0 XORY	12.0 FFEM	
SB App	SB Approach		• • • • • • • • • • • • • • • • • • •		 	55.3	t i	! ! !	TRUCKFERCENTS FRAKHOUFFACTORS	300	30,81	, 0	2.0 2.0	2.0 2. 0.90 0.9	
- RT TR	12/1 12/1 12/1	0.251 0.417 0.492 0.417 0.270 0.058	1 390 66 523 77 1	660 6 776 711 77 72	10.009 10.916 10.699	23.6 53.6 74.4	C+ 8 +D 1054 +E 124	8 ft 24 ft 24 ft	ACTUATIONS RECCERRANCES RINGHMANINGM	4000	25.00.00.00.00.00.00.00.00.00.00.00.00.00	XZZ XZZ X.000.0000.00000.00000.0000.0000	8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Nun K Nun c
NB Ap	NB Approach					36.0	å	! !	ENDGAIN STORAGE	000			, 4, 5000	10	
 E	12/1	0.562 0.658 0.410 0.300	1099 1226 174 525	878 478	10.716 10.900	22.3	0 t 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	999 £t 744 £t	Intalangura Intalantilohs Factors Patravar	2000	2000			1.99	
HB AP	ИВ Арргоасh	0 0 0 1 1 1 1 1 1 0 0		; ; ; ; ;	i : : : !	63.0	±	! ! !	NETATIONES NETATIONES SATURATIONELOHS	1.00	380	1380 1.00	1.00 1.00 1.00 1.00 1.00 1.00 0 1863 1770		
F -	TH+LT 12/1 0.291	0.291 0.158	1 193	-	167 10.763	63.0 • 2+		268 ft	Phasing Parameters SEQUENCES	eters 61 61					
EB Approach	proach					45.7	Δ		Perhissives Overlaps	NO CEL	NO NO NO NO NO NO NO NO NO NO NO NO NO N	NO YES	LEADLAGS OFFSET	NONE 0.00	NONE
F -	TH+LT 12/1 0.260 0.158	10.260 10.158	-	-	100 0.345	45.7	-	140 ft	GREENTHES	7.00 24.00	50 20	19.00	741177	2	>
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APPENDIX C LEVEL OF SERVICE CALCULATIONS

Base Year 2006 with Phase 1 and Phase 2

and 2
Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1

01/07/04

SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Haleakala Highway/Old Haleakal Degree of Saturation (v/c) 0.89 Vehicle Delay 72.2 Level of Sarvice E

Phase 2	* ^	G/C=0.444	Gm 80.0" Y+Rm 5.0"	OFF=52.8%
Phase 1 Phase 2	***	1 G/C=0.500 1		0.0
Sq 11	- 5	•		

0.0 Gm170.0 sac m 94.4% Ym10.0 sec m 5.6% Padw 0.0 sec Cal80 sec

Lane Width/ G/C Service Rate: Ad; HCM L Queue Group Lanes Reqd Used EC Volume v/c Delay S Hodel 1	la.	LT 12/1 0.616 0.500 575 885 933 1.054 90.6 *F 2180 ft	ผ	1 TH 24/2 0.610 0.444 227 1565 1517 0.964 72.3 *E 1721 ft	EB Approach	TH 24/2 0.416 0.444 714 1573 428 0.272 31.7 C 316 ft
		-:		-		-
De Lay	30.6 F	90.6	72.3 E	72.3	31.7 C	31.7
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5		0.500		0.44		0.444
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ž		9		9		7
5=1		=		_		=
5 5		12/1		24/2		24/2
=-	Ş	-	ç	-	ទ្ធ	-
Group	HB Approach	5	WB Approach	Ħ	EB Approach	7
:	문	_	9	1_1	ន្ទ	<u> </u>

FFLM NORM N 0.00 0.00 0 2.0 2.0 0.90 0.90 0 0 - Haleskelm Highway/Old Haleskel 90000 ET TH LT 5 0 0 12.0 12.0 0.0 12.0 1 1 1 1 FFLW NORM NORM 0.00 0.00 0.00 2.0 2.0 2.0 2.0 2.0 SIGNAL2000/TEARAC(Ver 1.11.00) - Summary of Parameter Values NOW 2000.00 RT TH LT
0 1365 0
0.0 24.0 0.0
0 0 24.0 0.0
NORM NORM NORM
0.00 0.00 0.00
2.0 2.0 2.0
2.0 2.0 2.0 221 223 7753 7753 85 Intersection Parameters for Int #
METROAREA.
SIMULATION PERIOD 15
LEVELOFSERVICE C 5
HODELOCATION 0 0 0
QUEUTHODELS 1 90 25 40 NT TH LT 0 0.0 0.0 0.0 0.0 0.0 NORM NORM 0.00 0.00 0.00 2.0 2.0 2.0 0.90 0.90 0.90 NO YES YES Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1 and 2 SB 0.0 0.0 0 0.00 0.00 0.00 0.00 Approach Parameters
APPLABELS
GRADES
PEDLEVELS
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PARKINGSIDES
PARKVOLUKES
BUGHTURNONNEDS
UPSITEMAVC
0. HOVLABELS
HOVLABELS
HOLDES
HIDTHS
LANES
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CONUMERATION
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NOX DHO

01/07/04

Institute for Astronomy PM Peak Hour of Traffic Year 2005 with Phases 1 and 2

01/07/04

SIGNAL2000/TEAPAC[Ver 1.11.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Haleskala Highway/Old Haleskal Degree of Saturation (v/c) 0.66 Vehicle Delay 15.1 Level of Sarvice

hase 2		 *	·		28.0"	X+R= 5.0"	OFF=45.04
Phase 1 Phase 2			***			X+R= 5.0" X+	
54 11		 {	North 1	- i ·		-	- 1

G= 50.0 sag = 83.3% Y=10.0 sag = 16.7% Ped= 0.0 sag = 0.0% g/C | Service Rate; Ad; | | HCH | L | Queue | Reqd Used | 8C (vph) &E |Volume| v/c | Delay | S |Hodel 1; | Lane | Width/| | Group | Lanes| R C= 60 atc

LT 12/1 0.277 0.367 591 649 422 0.650 18.1 *B 282 ft WB Approach TB 24/2 0.293 0.467 1608 1652 956 0.579 14.6 B+ 326 ft ZB Approach TB 24/2 0.352 0.467 1632 1652 1189 0.720 34.4 *B+ 400 ft	臣	NB Approach	2			1	ļ								ĺ			18.1	18.1 B			
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0 - Haleakala Highway/Old Haleakal SIGNAL2000/TEAPAC(Ver 1.11.00) - Summary of Parameter Values RT TH LT CONTROL OF CO Intersection Parameters for Int # HETROAREA NONCED 15
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Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1 and

SIGNAL2000/TEAPACIVer 1.11.00]

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| The butte for Astronomy | 14:08:02 |
| Mark Hour of Traffic | 1:00 | - Capacity Analysis Summary |
| Intersection Averages for int # 0 - Halsahala Highway/Old Halsahal |
| Degree of Saturation (V/c) 0.37 Vehicle Delay 9.0 Level of Sarvice A |
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- Summary of Parameter Values

01/07/04

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01/07/04 SIGNAL2000/TEAPACIVer 1.11.00] - Capacity Analysis Summary Institute for Astronomy PM Peak Hour of Traffic Year 2006 with Phases 1 and 2 01/07/04 Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1 and 2

Intersection Averages for Int # 0 - Haleakala Highway/Old Haleakal Degree of Saturation (v/σ) 0.53 Vehicle Delay 9.3 Level of Service A

NONE 1

Institute for Astronomy PM Peak Hour of Trafilo Year 2006 with Phases 1	10 10 1 and 2			01/07/04 16:09:10	Institute for Astronomy PH Peak Hour of Traffic Year 2006 with Phases 1	tronomy Traffic hases 1 and	'n					8 គ	01/07/04 16:09:10
SIGNAL2000/TEAPAC[Ver 1.11.00] - Sum Intersection Parameters for Int # APTHOMBER		ä	y of Parameter Values O - Haleskala Highway/Old Haleskal	Haleakal	SIGNAL2090/TEAPAC(Vef 1.11.00)	C[Ver 1.11	- {00:	Sumar	y of Pa	ramete	Summary of Parameter Values		
N PERIOD RVICE LON LS 1 90 ch Parameter	15 15 25 40 58 58 0.0	π. o. c	8 ° °	дос М о	Phasing Parameters SEQUENCES PERGISSIVES Y OVERLARS COLLES GREINTHES 20. ILLIOHTHES 5.	0 11 11 0 0 0 0 0	7 XX XX XX XX XX XX XX XX XX XX XX XX XX	7ES 10	0 0 1 1 1 1		LEADLAGS OFFSET PEDT D-CE	NONE 0.00	NON 1
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HCS2000: Ramps and Ramp Junctions Release 4.1d

		Fax:	the first to the
Tara Lucas ATA SO1 Summer Street	Suite 521 Honolulu, Hawaii 96817	Phone: (808)533-3646 E-mail: atahni@atahawaii.com	

	Freeze Data	
Type of analysis Number of lanes in freeway Free-flow speed on freeway Volume on freeway	Merge 2 55.0 1365	ярh Vph
R no	On Ramp Data	
Side of freeway Number of lanes in ramp Free-flow speed on ramp Volume on ramp Length of first accol/decel lane Length of second accol/decel lane	Left 1 35.0 840 500	ap V T T T C T T T T T T T T T T T T T T T T
Adjacent Ramp Data (if one exists)	Data (1f one	exists)

		Adjacent	Hqv	> -	-	- Ti			hcph
νph ft	<u>ء</u>	2 2	•			- 7			
	Conversion to pc/h Under Base Conditions	Ramp	840	233	0 Level		2.5	1.000	933
o.	ar Base	Freeway	40.00		7	- 7		8.	
	'n Und	Fre	1365	379	0 Level			1.000	1517
	to pc/								
	rston						ដ		
Does adjacent ramp exist? Volume on adjacent Ramp Position of adjacent Ramp Type of adjacent Ramp Distance to adjacent Ramp	Conve	Junction Components	Volume, V (vph) Peak-hour factor, PHF	Peak 15-min volume, v15 Trucks and buses	Recreational vehicles Terrain type:	Grade	Trucks and buses PCE, ET Recreational vehicle PCE,	Heavy vehicle adjustment, Driver population factor.	Flow rate, vp
27446	•	77	, a	, iii [4	12, 54		, ex		

Estimation of V12 Merge Areas (Equation 25-2 or 25-3)

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Equation	1517 pc/h
Using	1517
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ឧ្ទុំ	V = V (P) 12 F FM

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Capacity Checks	Actual Maximum LOS F7 2450 4500 No	2632 4600 No	Level of Service Determination (if not F)	Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 21.0 pc/hi/ln Level of service for ramp-freeway junction areas of influence C
	, l	10 812		Density, D = 5.4 R Level of service

		ųda	uph	hgh
ton	H = 0.340	s = 50.6	. × × ×	s = 50.6
Speed Estimation	Intermediate speed variable,	Space mean speed in ramp influence area,	Space nean speed in outer lanes,	Space mean speed for all vehicles,

HCS2000: Ramps and Ramp Junctions Release 4.1d

		Faxi
Tara Lucas	501 Sumner Street Suite 521	Honolul, namel 2011, Phone: (808)533-3646 E-mail: atahnl@atahawaii.com

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Freeway Data	Herge 2 55.0 860	On Ramp Data
	Type of analysis Number of lanes in freeway Free-flow speed on freeway Volume on freeway	

	trans.
On Ramp Data	Left 1 35.0 380 500
on Ra	el lane Cel lane
	Side of freeway Number of lanes in ramp Free-flow speed on ramp Volume on ramp Length of first accel/decel lane Length of second accel/decel lane
	Side of free Number of las Free-flow spi Volume on ra Length of fil

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sts)	#	tlons
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Data		Under
Ranp		pc/h
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Adjacent Ramp Data (12 one exists). Does adjacent ramp exist? Volume on adjacent Ramp	Position of adjacent Ramp Type of adjacent Ramp Distance to adjacent Ramp	Conversion to pc/h Under Base Conditions

Adjacent Ramp	dy >== 1	pcph
А, Н	, 7	
Ramp	380 0.90 106 0 106 11.5 11.5	1:00 422 Areas
_	- T	zge 2
Freeway	860 0.90 239 0 0 1.evel 1.5	1.00 956 : V12 He
•	ra Vra	fP 1.00 1.00 422 956 422 Estimation of VI2 Herge Areas
Junction Components	Volume, V (vph) Peak 15-min volume, v15 Peak 15-min volume, v15 Trucks and buses Recreational vehicles Grade Grade Trucks and buses PCE, ET Recreational vehicle PCE, 1 Recreational vehicle PCE, 1	Driver population factor, Flow rate, VP

(Equation 25-2 or 25-3)

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			1.05 F7
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1.000 Using Equation O	pc/h	Capacity Checks	Haximum
Using	956	apacity	-
1.000	E	ا	Actual
	re v (P) = 956 pc/h 12 F FH		

			pc/ml/ln		
1,0S F7 No	W O	not F)	27 L = 12.9 A	influence B	
Haximum 4500	009+	Determination (if	0.0078 v - 0.006	junction areas of	Speed Estimation
Actual 1378	1492	Level of Service Determination (if not F)_	Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 12.9	R Level of service for ramp-freeway junction areas of influence	paeds
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Averages for Int # 0 - Haleskals Highway/Makani Road of Saturation (v/c) 0.53 Vehicle Delay 21.3 Level of Service C+ Intersection 1

SIGNAL2000/TEAFAC[Ver 1.11.00] - Capacity Analysis Summary

												Y=10.0 sec = 11.1%
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Institute for Astronomy AM Pesk Hour of Traffic Year 2006 with Phases 1	SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values Intersection Parameters for Int # 0 - Haleakala Highway METROAREA HONGED 15 SIMOLATION PERIOD 15 LEVELOFSERVICE C 8 NODELOCATION 0 0 QUEURAODELS 1 90 25 40	Approach Parameters ApplyBELS GRADES PEDLEVELS	Birevolukes Parkingsides Parkvolukes Busvolukes	richtturonreds Upstr ea nc	Movement Parameters MOVIABELS
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SIGNAL2000/TEAPAC(Ver 1.11.00) - Capacity Analysis Summary

Intersection Averages for Int # 0 - Haleakala Highway/Hakawao Aven Degree of Saturation (v/c) 0.63 Vehicle Delay 33.8 Level of Service

| HCM | L | Queue | | Delmy | S | Model 1| 222 | C+| 11 E | | C+| 17 E | | C+| 46 E \$25 510 110 15.5 B 33.3 C 45.2 -0 35.2 |0.341 | 15.5 | |0.877 | 42.3 | |0.051 | 39.5 | 26.8 48.3 41.7 10.393 10.698 10.821 10.030 10.696 10.331 g/C | Service Rate| Adj |
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01/07/04 16:13:08 SIGNAL2000/TZAPAC[Ver 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - Heleakala Highway/Hakawao Aven Degree of Saturation (v/c) 0.68 Vehicle Delay 50.4 Level of Service D

9	Phase 1	Sq 56 Phase 1 Phase 2 Phase 3 Phase 6	Fuare 3	Phase 4	Phase 5	Phase 6
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SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

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Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1 and 2

SIGNAL2000/TEAPAC(Ver 1.11.00] - Capacity Analysis Summary Intersection Averages for Int # 0 - Kulm Highway/Haleskelm Highway Degree of Saturation (v/c) 0.90 Vehicle Delay 54.6 Level of Service D

Phase 3 Phase 4	_		***	<u> </u>		!	.0" G= Z3.0"	-
Phase 2	_	+ + + *	» 	+ *	 * *	G/C=0.089	G= 8.0" G= 33.0" Y+R= 5.0" Y+R= 5.0"	OFF=12.24 OFF=26.
Sq 61 Phase 1	•	 •		‡	++	i T	Y+8 5.0"	0.0 -110 I

C= 90 sec G= 70.0 sec = 77.8% %=20.0 sec = 22.2% Ped= 0.0 sec = 0.0% |Width/| g/C | Service Rate| Adj | | HCH | L | Queue | | | Innes | Rend Used | G (vol.) Or | Vol.mes | v/c | Delay | S | Model 1 Lane

_ !	Group	- {	Lene	2 i	ď	Group Lanes Redd Used 8C (vph) 0Z Volume v/c Delay S Model 1		5	<u>ફ</u> ¦	2	You	9	Ĭ	_;	(vph) (Z [Volume] v/c Delay S [Model 1]	-		g	7
Д	SB Approach	ឡ													44.4 D+		±		
i :	TR I		12/1 12/1 12/1	000	123 388 152	12/1 0.123 0.367 422 581 12/1 0.388 0.367 546 683 12/1 0.152 0.067 1 99		122	50	1883		ν <u>α</u> ξ	6 10.010 1 589 10.862 1 94 10.797 1	001	20.1 C+ 6 ft 40.3 D+ 671 ft 72.0 *E 130 ft		##-	671 130	444
e	NB Approach	ថ្មី													59.5 E+		ţ.		
I !	 2 2 3 	!	12/1 12/1	22	558	TH 12/1 0.558 0.511 846 952 944 0.992 54.4 *D 1196 ft LT 12/1 0.287 0.211 223 371 361 0.965 73.0 *E 506 ft		23	6	22	ă ñ	35	0.99	25	54.4 *D 1196 £t 73.0 *E 506 £t			506	##
e	HB Approach	ឡ		1											71.9	N	63		
I_:	TH+L	ㅠ	12/1	2	324	TH+LT 12/1 0.324 0.256 207 310 300 0.955 71.9 *Z 424 ft]	5		2	<u> </u>	<u>_</u>	0.95	- 1	71.9 *E	Ξ	-	424 £E]	4
9	ZB Approach	ชื่	_												28.1	υ	63		
I _	CI+RI	:	12/1	2	182	TH+LT 12/1 0.182 0.256 330 470 178 0.379 28.1 C 172 £t	_	85	ľ	2	_ 	<u>۔</u>	0.37	_	28.1	_	_	172	ű

Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1 and 2

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Intersection Perameters for Int # 0 - Kula Highway/Haleskala Highway
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SIMULATION PERIOD
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SIMULATION PERIOD
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QUEUZHODELS 1 90 25 40 SIGNAL2000/IEAPAC[Ver 1.11.00] - Summary of Parameter Values

Approach Parameters

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NB 0.00 0.00 0.00 0.00	TH 117 850 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.	
дооонооо	H H H H H H H H H H H H H H H H H H H	
NOW 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	LT RT TH 85 170 12.0 1 1.0 1 1 1 1 0 0 1 12.0 2.0 12.0 12.0 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	
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61 80	YES	180	8.00	5.00	O1	
raneters 61 NO	77.9	8	6.00	5.00	m	0
Phasing Parameters 51 SEQUENCES 61 PERMITS NO	CVERLAPS	CYCLES	GREENTINES	TELLONTINES	CRITICALS	EXCESS

Institute for Astronomy	PM Peak Hour of Traffic	Year 2006 with Phases 1 and 2

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SIGNAL2000/TEAPAC[Ver 1,11,00] - Capacity Analysis Summery

Intersection Averages for Int # 0 - Kula Highway/Haleakala Highway Degree of Saturation (v/o) 0.82 Vehicle Delay 47.5 Level of Service D

and I be a limited and the second an	*** >	417 G/C=0.158 .or G= 19.0r .or Y+Nm 5.0r .2% OFF=80.0%
Sq. 61 Phase 1 Phase 2 Phase 3 Phase 4	***> ++* * +++ ***	1 0 4 0 0 1
Phase 1	***	0/C=0.058 C= 7.0" Y+R= 5.0" OFF= 0.0%

| 0.251 | 0.417 | 390 | 660 | 6 | 0.009 | 23.6 | C+| B Et| | 0.437 | 0.417 | 523 | 776 | 722 | 0.930 | 56.1 | *E+|1086 Et| | 0.270 | 0.058 | 1 | 77 | 72 | 0.699 | 74.4 | *E | 124 Et| TH | 12/1 |0.579 |0.658 | 1099 | 1226 | 917 |0.748 | 23.7 | C+|1066 ft| | 12 | 12/1 |0.419 |0.300 | 174 | 525 | 500 |0.942 | 68.9 |*E | 808 ft| | Lane | Midth/| g/G | Service Rate| Ad) | | BCH | L | Queue | Group | Lanes| Reqd Used | 8C (vph) 8E | Volume| v/c | Delay | S | Hodel 1| å 39.6 | RT | 12, | TH | 12, | LT | 12, NB Approach SB Approach

66.6 Z+ | TH+LT| 12/1 |0.293 |0.158 | 1 | 191 | 172 |0.793 | 66.6 |*E+| 281 ft| 1 | 264 | 100 |0.345 | 45.7 | D | 140 £t| 45.7 D 1 10.260 10.158 [EB Approach | TH+LT| 12/1

Institute for Astronomy PH Peak Hour of Traffic Year 2006 with Phases 1 and 2

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SIGNAL2000/TEAPACIVer 1.11.00] - Summary of Parameter Values

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.eters sB 0.0 0.0 NONE 20 0.00 0.00 0.00	TH LT 650 65 12.0 12.0 12.0 12.0 0.00 0.00 0.00 0.00	8 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	61 61 NO NO NO TES TES 120 00 24.00 00 5.00
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Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1 and 2

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SIGNAL2000/TEAPAC(Ver 1.11.00) - Capacity Analysis Summary
Intersection Averages for Int # 0 - Old Haleskala Hwy/Pukalani St
Degree of Saturation (v/c) 0.58 Vehicle Delay 17.1 Level of Service B

G# 50.0 sec # 83.3% Ym10.0 sec # 16.7% Pad# 0.0 sec # 0.0% C= 60 sec

HB Approach RT 12/1 0.291 0.600 925 950 378 0.398 7.6 *A 169 ft. RT 12/1 0.392 0.433 719 767 639 0.833 22.9 C+ 472 ft. RB Approach 71 12/1 0.182 0.400 692 745 267 0.358 12.9 B+ 148 ft. RB Approach 850 745 267 0.358 12.9 B+ 148 ft. RB Approach 87 12/1 0.070 0.083 409 461 383 0.831 28.2 *C 305 ft. RT 12/1 0.212 0.750 1188 1188 244 0.205 2.6 A 69 ft. RB 12/1 0.109 0.233 363 435 139 0.320 19.5 B- 92 ft.	i	Lane Width/ g/C Service Rate Adj HCM L Queue Group Lanes Reqd Used @C (vph) @E Volume v/c Delay S Hodel 1		33	57	Regd	رة	Į.		Servi C	8£	25.0		P. S.		۵/۵	!	Delay		_ _ =	20	. =
12/1 0.291 0.600 925 950 378 0.398 12/1 0.392 0.433 719 767 639 0.833 12/1 0.182 0.400 692 745 267 0.358 12/1 0.070 0.083 409 461 383 0.831 12/1 0.212 0.750 1188 1188 244 0.205 12/1 0.109 0.233 363 435 139 0.320	g.	Appro	길	_										÷			;	17.2				Ì
## Approach TH 12/1 0.182 0.400 692 745 267 0.358 12.9 B+ 148 ft LT 12/1 0.070 0.083 409 461 383 0.831 28.2 4c 305 ft RT 12/1 0.212 0.750 1188 1188 244 0.205 2.6 A 69 ft TH 12/1 0.109 0.233 363 435 139 0.320 19.5 B 92 ft	l i	;		12/1	22	. 392	00	500		925 719		950 767		378 639	<u>••</u>	398 833		7.6	≮ ΰ		22	##
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Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1 and 2

SIGNAL2000/TEAPACIVer 1.11.00] - Summary of Parametor Values

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Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1 and 2

SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

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Institute for Astronomy PM Peak Hour of Traffic Year 2006 with Phases 1 and 2

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SIGNAL2000/IEAPAC[Ver 1.11.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Old Haleskala Hwy/Pukalani St Degree of Saturation (v/c) 0.66 Vehicle Delay 23.9 Leval of Service C+

												0.0
												Cw 60 sag Gw 50.0 sec m 83.3% X=10.0 sec w 16.7% Pedw 0.0 sec m 0.0%
												0 sec # 16.7%
Phase 3		****		>		- + +	-	6/0-0.533	32.0"	T+R= 0.0" 1	OFF=46.74	83.3% X=10.
Sq. 0 Phase 1 Phase 2 Phase 3				>		- -	- -	G/Cm0.217 G/Cm0.083 G/Cm0.533	Ge 13.0" Ge 5.0" Ge 32.0"	X+X= 5.0"	OFF=30.0%	04 60 msc
Phase 1			_	_	North <+ •>	* + ‡ ‡	* + > -	G/C=0.217	13.0"	1+R= 5.0"	1 orr= 0.04	C= 60 sec
25 0	•	·<	_	-	North	_						

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Phasing Parameters SEGURACES TES CVERLARS TES CYCLES GO GREATHES 5.00 CRLTICALS 5.00 CRLTICALS PHASEMOVERHYS 2 PHASEMOVERHYS 2 PHASEMOVERHYS 5 PHASEMOVERHYS 5 PHASEMOVERHYS 5 PHASEMOVERHYS 5 PHASEMOVERHYS 5 PHASEMOVERHYS 5

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| Lane | Width/| g/C | Service Rate| Adj | | HCM | L | Quue | | Group | Lanes| Reqd Used | @C (vph) @E |Volume| v/c | Delay | S |Hodel 1|

| RT | 12/1 |0.345 |0.383 | 541 | 607 | 472 |0.778 | 25.7 |*C+| 354 Et| | 12 /1 |0.216 |0.217 | 312 | 383 | 311 |0.812 | 34.8 | C | 261 Et|

NB Approach

29.3 C

TH 12/1 0.163 0.617 1136 1149 233 0.203 5.1 N 83 Et LT 12/1 0.097 0.083 601 632 628 0.994 45.9 *D 632 Et	0.617 11	7						
	0.083 6		632 1	233	0.203	5.1	- a	83 £t 632 £t
EB Approach						6.3	6.3 A	

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	Summary of Parameter Values	LEADLAGS OFFSET PEDTINE		000												
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and 2	1.00]	1123	8.8 8.8 8	F @ RS	000											
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Institute for Astronomy PH Peak Hour of Traffic Year 2006 with Phases 1	BIGNAL2000/TZAPAC[Ver 1.11.00]	Phasing Parameters SEQUENCES PERMISSIVES X OVERLARS	GREENTINES TELLONTINES CRITICALS	excess phasemovements phasemovements phasemovements	PHASIMOVIMENTS PHASIMOVIMENTS PHASIMOVIMENTS											
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Institute for Astronomy PH Peak Hour of Traffic Year 2006 with Phases 1	SIGNAL2000/TEAFAC[Ver 1,11,00] - Summary of Parameter Values Intersection Parameters for Int # 0 - 01d Haleskala Bry APPROADES	SINULATION PERIOD SINULATION PERIOD NUDELOCATION QUEUTHODELS 1	Approach Parameters APPLABLIS GRADES	BIKEVOLUMES PARKINGSIDES PARKVOLUMES	richturionreds Upstreamo	Movement Parameters MOVIABELS RT	VOLUMES WIDTHS	Lanes Grouptypes Ittlerfors	TRUCKPERCENTS	ARRIVALITYPES ACTUATIONS	RZQCIZARANCES HINDRINS	STARTUPLOST	STORAGE	IDEALSATELOWS	DELAYFACTORS	NSTOPIACTORS SATURATIONFLONS
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Institute for Astronomy
AM Peak Hour of Traffic
Tear 2006 with Phases 1 and 2
SIGNAL2000/TEAPACIVEr 1.11.00] - Capacity Analysis Summary
Intersection Averages for Int # 0 - Old Heleakela Highway/Hakavao
Degree of Saturation (v/c) 0.60 Vehicle Delay 17.6 Level of Service B

												_	
Phase	:	****	****	**** <	> +++	<u> </u>	##	>	G/C=0.400	_	_ X+N= 5.0"	OFF=51.74	,
Phase 2		_	_	< _	<u>‡</u>	<u> </u>	<u>‡</u>	>	G/C=0.050	3.0"	1 X+K= 5.0"	ö —	
Phase 1	* * + -	• • •	<u></u>	>	< _	++	+++	+ + +	1 G/C=0.300	18.0"	I+KE 5.0"	OFF- 0.04	
Sq 0	•	•	{	_	_	North L	_	1	, _				•

0.0 G= 45.0 sec = 75.0% X=15.0 sec = 25.0% Ped= 0.0 sec 0 ŝ **.**

Group Lanes Redd Used 8C (vph) 8E [volume] v/c Delay S Hodel 1	Lane	F Regd	Desd .	!	(()	3.		Volum		٧/٥		HO HO	 4 0	<u> 주 중</u>	101
SB Approach	ę,											20.3 C+	t		<u> </u>
RT 12/1 0.219 0.300 395 475 256 0.539 21.9 C+ 180 £t TH+LT 12/1 0.132 0.300 298 357 105 0.294 16.6 *B 66 £t	12/1	0.219 0.132	RT 12/1 0.219 0.300 395 475 256 0.539 21.9 C+ 180 £t TH+LT 12/1 0.132 0.300 298 357 105 0.294 16.6 *B 66 £t		395 298	₹0	1 75	256 105	<u> </u>	539 294		395 475 256 0.539 21.9 C+ 180 £t 298 357 105 0.294 16.6 *B 66 £t	ο O		30 £t
ИВ Арргоасh	÷			į								24.5 C+	ដ		
RT+TH+LT 12/1 0.261 0.300 427 492 361 0.734 24.5 C+ 271 £t	12/1	10.261	10.300	_	427	=	22	361	<u>ė</u>	ž	_	24.5 C+ 271 £t	.	- 27	7
HB Approach	Ę											21.0 C+	ដ		
RT+TH+LT 12/1 0.343 0.400 592 646 494 0.765 21.0 *C+ 353 ft	12/1	10.343	RT+TH+LT 12/1 0.343 0.400 592 646 494 0.765 21.0 +C+ 353 ft	_	592	ě	9	\$	<u>.</u>	765	I _	21.0	÷	35	3 £

9.9 | A | 280 ft | 6.9 | A | 37 ft | |RT+TH+LT| 12/1 |0.343 |0.400 | 592 | 646 | 494 |0.765 |

EB Approach
|RT+TH | 12/1 |0.326 |0.533 | 957 | 987 | 539 |0.546 |
|LT | 12/1 |0.084 |0.533 | 913 | 944 | 94 |0.100 |

Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1 and 2

SIGNAL2000/TEAPACIVer 1.11.00] - Summary of Parameter Values

RT TH LT
20 465 85
0.0 12.0 12.0
0 1 1 1
0 0 1 0 000
2.0 2.0 2.0
0.90 0.90 0.90 20000 00000 70.00 10.00 100vir 0 - Old Heleskele Highway/Makawao RT TH LT 215 80 30 0.0 12.0 0.0 0 1 0 NORM NORM NORM 0.00 0.00 0.00 2.0 2.0 2.0 2.0 2.0 2.0 3 3 3 3 NOME 2000 Intersection Parameters for Int #
HETROAREA NONCED
SIMULATION PERIOD 15
ILEVILOPSERVICE C 8
NODELCCATION 0 0
QUEUTHOODELS 1 90 25 40 RT TH LT 230 40 55 12.0 12.0 0.0 1 1 0 1 0000 0.0 0.00 0.00 0.00 0.90 0.90 0.90 22.000 Approach Parameters
APPLABELS
GRADES
0
PEDLEVELS
BIKEVOLUMES
PARKINGSIDES
PARKINGSIDES
PARKOLUMES
BUSVOLUMES
BUSVOLUMES
RIGHTTOWNOWREDS
0.0

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01/07/04 14:18:26 Institute for Astronomy AM Peak Hour of Traffic Year 2006 with Phases 1 and 2

SIGNAL2000/TEAPAC[Ver 1.11.00] - Summary of Parameter Values

LEADLAGS OFFSET PEDTIME ٥٥٥٢٥٥٥ 8 2 NO NO TES TES 120 3.00 24.00 5.00 5.00 5.00 Phasing Parameters
SEQUENCES
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Intersection Averages for Int # 0 - Old Halenkala Highway/Makawao Degree of Saturation (v/c) 0.63 Vehicle Delay 22.2 Level of Service C+

SIGNAL2000/TEAPAC(Ver 1.11.00) - Capacity Analysis Summary

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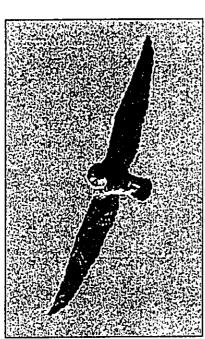
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Cultural Impact Assessment

'A'apueo I Ka La'i

'A'apueo In Tranquility



Pueo (Hawalian Owl)
Asio Jammeus sandwicensis

The University of Hawuii Institute For Advanced Technology Astronomy 3.425 acre site Kulamalu Town Center, 'A'apueo, Mani, Hawaii

NO IMPACT

MAY 2003

Prepared for:
KULA MALU SCIENCE L.L.C.
2005 Main Street, Wailnku, Hawaii
96763 * (808) 2441500

CKM Cultural Resources Kahu Charles Kaultwehi Maxwell Sr. 157 Alea Place Pukalani, Maui, Hawai'i 96798

'A'apueo I Ka La'i

'A'apueo In Tranquility

TITLE PAGE

May 2003

The University of Hawai'i Institute For Advanced Technology Astronomy Kulamalu Town Center, 'A'apueo', Maui, Hawai'i Tax Key #2-3-008:38, 3.415 acre site

Final Copy

No Impact

¹'A'spuco is a female goddess of all the ow! 'sumakus (personal god), W.H. Usua, The Legand of the Battle of the Owit, KeAs Obos, June 29 1871, 2. MS SC. Sterling 3.12.3.

'A'apueo In Tranquility 'A'apueo I Ka La'i

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'A'apueo I Ka La'i 'A'apueo In Tranquility

ABSTRACT

CKIM Cultural Resources conducted a Hawaiian Cultural Resource Evaluation for the University of Hawaii's Institute for Advanced Technology Astronomy, at the Kulamalu Town Center, 'A'spueo', Maui, Hawaii', Tax Map Key #2-3-008:38, 3,425 acre site. This study is in accordance with The Office of Environmental Quality Control, which describes resources having Hawaiian Cultural Value. It will describe potential impacts from further development, along with measures that could possibly be employed to mitigate those impacts. The study will evaluate the cultural significance of historic and prehistoric resources identified during an archaeological survey and assist in the development of a general preservation plan for those resources. It will also address the requirements of the Office of Hawaiian Affairs, in regards to cultural impacts. Specifically, the document will address potential affects on the Hawaiian Culture and Traditional Customary Rights as described in the legislation known as Act 50. Sessions Lays of Hawaii', 2002.

A Hawaiian Cultural Resource Evaluation of this area revealed that it is located in an area called 'A'apuco, which is in between two prominent guiches. One guich is called Kaluapulani 2, which is on the Makawao side of the project area, and the other guich is called Kalualiuni 3. The project site is located within the Kulamalu Town Center, an area of approximately 3.425 acres.

Traditionally, Maui was divided into twelve (12) Ahupua'a'(Political District today), with nine of these Ahupua'a located in East Maui. The districts of Kahikinui, Honua'ula, and Kula were identified as lands that were used for agricultural fields, which were planted in the late Hawailan history (Kolb 1991). In the "Ruling Chiefs of Hawail", by Samuel Kamakau, it mentions that Kiha-a-Pillani, the son of King Pillani lived in the area under study, and he had the best sweet potato patch in the upcountry area.

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^{&#}x27;A'spuce is a female goddess of all the owel 'sumaknut/personal god), W.H. Usus, "The Legend of the Banks of the Owels". Kelsu Olsoe, Ione 29 1871, 2. MS SC. Sterling 3.12.3.

*Kainspotantis is a gulch on the Maxwas site of the project, constaining numerous peroplyphs.

*Kainslinen; is a gulch on the Maxwas site of the project. It no contains peroplyphs and other important enthuri features. (Refer to Archaeological Reconstainance Survey, submitted by PHRI, Feb. 1996.

*Adequate is a land division untuly extending from the uplants to the sex, so called because the boundary was marked by a heap (shu) of stones surmonated as limits of a pig (past of).

*Ruling Chiefs of Hawai', page 24 & 25, speaks about the sweet points patches of Kiha-a-Pillani.

E.G. Handy (Handy 1940); 161) notes that, "Kula was always an arid region, throughout list long, low seathore, vast stoay Kula lands, and broad uplands". Kula land is described by Handy and the Mandy (1972; 510) as, "topen country, or plain, as distinct from valeby.....and and soften been used as a term to distinguish between dry or Kula land and wet-taro land".

During pre-contact times, lands in the Kula district were utilized for farming. In the uplands, dry land (non-irrigate) hare pathes grew up to an altitude of 3,000 feet (Handy and Handy 1972;337). While sweet potato crops grew well when the conditions were right, frequent schacks occurred in the form of grubs, caterpillars, blight, fred, to from much sun, and the people were then burdened with famine. "During these times, they were forced to subsist on "asulet, pusitel, popolo and other weeds" (Kamakau 1992;23).

Traditional Hawaiian agriculture was labor intensive and relatively restricted in the less then ideas in the whale in the relation of provisions for the whaling industry, and later the gold miners in California, Kula experienced an increase in cultivation.

Kuykendall (1968) (1):313) describes the period when Kula farming trantitioned from subsistence crops to commodities; "Before that time the whalers created a limited market for fresh mer, and full; the great increase in the unmer of whale also as the safe and value, poistores (sweet and triat) ranked for in this terrific. Juri's describes the region as it appeared to him in July 1846; "It ranges along the mountain (Halleakala) between 2,000 and 5,000 feet deration, for the distance of 12 milled market for fresh near, man for the ground is immense. The fields being all in thosens the interspecture, spreading as they do, over the broad surface of the mountain.

From Kula, the positoes were carried down to the since, and taken to all controperous, together with the abores of allawillar were gold luredty to ablps which called at Kalepolepo. The influx of gold ruth, bundered with the abores were

addition to the influx from other parts of the island, they came to Kula from Honolulu and Kohala (on the island of Hawal'i). Much of the land was owned by the Hawalian government, who in turn leased it to the ranchers, who then subleased it to the Chinese. In some instances, farmers made their lease payment in farm produce in lieu of monetary transactions.

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population continued to grow. For a period of 30 to 40 years, Kula supported a thriving community which included Chinese and English Schools, Christian churches, a Chinese Society, gambling joints, oplum dens, general stores, and While the demand for Kula potatoes had diminished by the mid-1850's, the Chinese dozens of operating farms and cattle ranches (Mark 1976). By the 1880's, sections of lower Kula had largely become pasture for the booming cattle industry. Large sections of crown land were leased for grazing (Silva IN Miura 1962). In 1911, the Hawalian government released a large amount of public land, and it became possible for citizens to purchase property in Kula. During the 1910's and 1920's, many families left Kula for various reasons, such as: severe drought which devastated crops and livestock, soil which was reaching depletion levels after years of harvesting and tilling, lack of educational opportunities for their children, and loss of land due to parceling homesteads. Later, during the 20° Century, lands in the project area were primarily utilized for pasture and pineapple cultivation. No cultivation of any kind has taken place at the study site for about 25 years. There are still remnants of the old pincapple roads and furrows where the plants once grew.

Note: As much as possible, throughout this report, the spelling of Hawaiian vocabulary and place names have been standardized to present orthography.

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'A'apueo I Ka La'i A apueo In Tranquility

OUTLINE

L Introduction

2. Scope

II. Specific Area of Research

a. 'A'apueo

1. Clarification of area.

b. Surrounding 'ill within Kula

III. 'A's pueo: The Historical and The Cultural Context

a. 'A'apueo: The female delty.

b. Lifestyle

c. Native vegetation and habitat

1. Native plant growth

2. Wildlife

IV. Conclusion

V. Bibliography

'A'apueo I Ka La'i

'A'apueo In Tranquility

INTRODUCTION

MAY 2003

INTRODUCTION – EIA KA LÅ HIKI

The scope of this report will be to compile various historical, cultural, and topographical accounts and facts of 'A'apueo and its adjacent ahupu'a.' With only a few exceptions, direct references to 'A'apueo are meager. Therefore, the following description of the project area is derived from topographical, cultural, and usage descriptions of the more general areas of Kula. The report will be;

(1) In accordance with O.E.Q.C. guidelines, the study will describe resources having cultural value, and will describe potential impacts from further development along with measures that could be employed to miligate those impacts. The contractor will coordinate with the archeologist characterizing the site to evaluate the cultural significance of historic and prehistoric resources identified during an archeological inventory, and will assist in the development of a general preservation plan for those

(2) It will also include a Traditional Practices Assessment that will meet the assessment requirements of O.E.Q.C. and O.H.A. for cultural impacts. Specifically, the document will address potential effects on Hawai'i's culture, and traditional and customary rights, as described in the legislation known as Act 50, 2000.

Specific Area of Research:

This project site shall be identified as Lot Numbers 15, 16, and 17 of TNIK 2-3-08: 38 and 39 (portion). These said lots reside in the abupua's of Kula and in the 'iii' of 'A'apueo.

'A'apueo: 'A'apueo is a unique 'ili, and has a distinct topographical position.
'A'apueo is nestied on ridges, which would have made this area a safe area to live.

'Abuput's: Land divisions. Much of the information of this compilation will also derive from the adjacent had divisions due to the lack of written and contextual information based on various written and noted sources.

2 TH: Land section within a specific land division.

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A kahuna once lived in 'A'apuco, and his sole responsibility was to protect a belan that was built on Pu'apane hill, in the Kula ahupua'a. While Kihapi'ilani and his wife stayed at 'A'apuco, they came in contact with this kahuna, who then gave the King and Queen a tour of the abupua'a.

Many surrounding 'ili within Kula are either adjacent or perpendicular operty. the said pro

Surrounding 'Ill within Kula:

There are many 'ill within the ahupua's of Kula which stretch from the shoreline to the peak of the mountain. 'A' apuco is located on a high elevated plain of this ahupua's. This 'ill is surrounded by other 'ill, such as Maka'eha (separated by Kallalinui gulch), Öma'oplo, Keahua, Kallua, and many other 'ill'ill'.

Maka'cha: (Lit. sore eyes) Maka'cha is rich with heritage. Much of the upper plains of the Knia region were dry and arid. This had left only a few options for the types of plants that could be cultivated here, and it was the home to one of the best plants that could handle such arid conditions. This area was the home to King Kihapi'liani's mala 'naia (Sweet Potato Garden). Maka'cha is now called "Pukalani". It takes its name from a hill in the Maknickaliua* area, which is called "Pu'kalani" (it meaning; "Hill to heaven").

Pu'ppane: (Lit. hill of answers) Pu'upane resides within the district of Kula. This hill was decreed by a ruling chief of Maul to be sacred. No commoner ascended this hill, for it was a helau for the high chiefs of Maul, stretching from ancient times until Kihapi'ilanl's arrival upon the hill of Pu'upane. A certain kahuna lived at 'A'apuco to make certain that no commoner ascended Pu'upane, and allowed only those who were sanctified to do so.

Oma'opio: (Lit. whistling thrush) Oma'opio has four registered helau and numerous abn'. Lozated at Oma'opio is a helau named Mo'omuko'. This extensive belau measured some ninety feet by one hundred and eight feet. Another registered helau is Mahia helau, located more to the north than Mo'omuku. This helau is also smaller than Mo'omuku, at thirty-two feet by forty-one feet. Po'ohinahale helau is located on the opposite side of Mahia helau. This may also be the same helau that is called Kaunnopabu, however the only living informant gave the name Po'ohinahale.

'A'spuro: The female deity:

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'A'apuco. In various translatious, the term 'A'apuco could mean "the owl's wall." The place name could also reflect the topography of the area, which is encompassed by the 'a'a rock. However, most sources believe the place was named after a female deliy. A female by the name of 'A'apuco once resided in this area, and 'til this day the area bears the name 'A'apuco.

Lifestrie

describe some of the topographical features of this ahupua's, much of its landscape is dry and arid. Therefore, farming was limited to plants that were tolerable to cold evenings and hot tempered days. Although the landscape of Kula has changed considerably over the past two to three bundred years, the climate has remained constant. The scene for most of the landscape was farming families. The word Kula in Hawaiian translates to plain. While this may barely

due to the fact that the people of Kula were not accustomed to the ways of the ocean. Families that lived near the ocean, and those who frequented the shores, mocked the people of Kula who lacked experience in the ocean lifestyle. Therefore, those who lacked the experience needed to master the familiarities of the ocean were deemed It was often documented that the people of Kula were incompetent. This was locompetent. Today, Kula is a rapidly changing community, being very different from its scene ten years ago. The area is still largely agriculturally zoned. However, the demand for the suburban lifestyle shows its price, at nearly one million dollars for a choice lot, its hilisides are abundant with wild deer that were introduced within the last 3 decades, and which is the cause of mass erosion and crop damage to the surrounding areas and farms of Kula. Many of the culturally significant sights, such as beiau and ahu, are no longer existent due primarily to the "paniolo" age". During this era, much of the land was cleared for the Industrially driven use of cattle ranching. Helau and ahu During the late 1950's and 1960's, the conceptualized "suburbla" became the dream place to live, and thus began the influx of homes and population in Kula. This left little recovery of what had already been destroyed by the paniolo era. Fifty years ago, a Cultural Impact Statement was not an issue, and neither was the significance were plundered without regard for its significance to the area. As mentioned earlier, the ahupus's of Kuis had many helau and ahu located in 'ill such as Oma'oplo. of documenting Hawalian antiquities. This is the reason for the lack of information of such items,

Titili: Smaller Land Sections within a specific land division and land section.

Manuleralitatioid Kallan), located below what is now Putatani, above Keshau.

Manuleralitatioid Kallan), located below what is now Putatani, above Keshau.

Heisan Spritual Priest (Lit keeper of the secret)

Kashams: Spritual Priest (Lit keeper of the secret)

Abair Personal platforms of which commoners and royally alike created to beed offerings to various gods and guardians.

When wantlated Mo omatio means "disacted lizated."

Paniolo Age: The era of conboy influx in the Kula region.

Native Plant Growth:

The vegetation in the Kula and 'A'apuco area do not flourish as generously as various other abupua's on Mand.

Every aspect of the traditional lifestyle was closely interconnected with the life forms of these lained. The asylog, "He Hawai'! At" — I am Hawai!" - reveals this basic truth; the people and their environment are one. All of the needs of the population (which numbered nearly as many as those who inhabit Hawai'! today) were provided for abundanily from the life of the land and occan, created by the stored energy of the sun, and materializing in multitudes of useful and beautiful forms.

Due to the geographic location, as the most kolated land in the world (5,000 miles from the nearest continent), the Hawaiian archipelago evolved incredibly diverse and unique ecosystems, with myriad species of flora and fauna found nowhere else on the plane.

A well-known tree is the sandalwood (Santalum freyctinetlanum), known in Hawaiian as Tilah. The wood was traditionally used to seen kaps cloth, it was sometimes used to make 'takete (a maxical bow), the only traditional Hawaiian stringed instrument. The leaves and wood of sandalwood trees were also used medicinally, often in combination with "awa and other woods. One type of sandalwood, of the lanchers variety, occurs near the peak of Kula's boundaries. With a red flower, it is found only on East Maui and Lāna', and is an endangered species. Only around 100 plants survive today, with a population found on the south slope of Kula.

Other medicinal plants from this area include the 'Ahina Kuahiri (Gumera petalolides), also known as the Ka'ape'ape or 'Ape'ape, and the Mau'u La'ill (styrinchlum acre), a crawling grass (native iris) found on Kula's highest poin. The durable wood of the golden-flowered lary Maname or Kolomona tree (sophora etrysophylla) was utilized to make o'o (digging sticks), honse poles, and bolina stels.

Most of Kula's landscape is in a fairly dry and arid state, and thus most plants do not do well in places like these. Howeve

Due to the dry conditions, kalo or taro was not a suitable crop to plant. To supplement the need of wet land kalo, the 'uala (sweet potato) was grown as an alternative. Many sources point to the example of Kihapi'ilani's potato patch in Maka'eha. Sweet potato was just as stable and healthy as kalo, yet required less water to fruit, whereas the kalo grew best in fields of fresh running water.

Another plant that may have grown in this area, to supplement the need of kalo, is 'ulu (artocarpus incisus) or breadfruit. According to "Native Planters in Oid Hawai'i: Their life, fore, and environment," written by E.S. Handy et al. explicates, "...early voyagers noted extensive planting of breadfruit along the southern and iceward coast..." Although this statement singles out the Southern and iceward coasts, which are the driver areas of the island, Kula still made a perfect place for 'ulu to flourish because of its arid plains.

Another blossoming plant that has resided in this area is the 'a'ali's (dodonaes viscosa) bush. This hard wood native shrub is indigenous to the islands. This plant also grows well in dryer elimates. Ranging in heights of one to thirty feet, this shrub/tree is found growing at elevations of np to 8,000 feet, and in wind-swept open country. It is found today in the guiches and surrounding area of this site.

(heterogon contortus). This grass was siso quite common in these areas because of the climate conditions. Pili liked to grow in arid and dusty conditions. The Hawaiian people would bunch dried clumps of grass together to create a waterproofed house. 2 One essential plant used to construct thatched homes was the Pill

Wildlife:

There is little recorded information about the wildlife in the Kuia"A'spuco region. However, today the area is infested with foreign plants, wild feral, and fowl. This has left much of Kula's natural habitat destroyed.

In 'A'spuco's own region, seldom does the native owl take flight. It is the common barn owl, native to North America, which primarily inhabits the region. The common barn owls tend to be more aggressive in nature, which has caused depiction in other native birds and native plant species.

Conclusion:

Much of 'A'spuco's history lacks in quantitative measures, therefore it is extremely difficult to extract the details of a lifestyle unfamiliar to those of today. The natural habitat is inundated with foreign forest shrubbery and various other plants brought in to "beautify" certain landscapes. An abundance of cactus plants can be seen thriving in the landscape.

The two guiches that all on either side of the ridge largely protect 'A'spuco. History tells us that this feature was the reason 'A'spuco was a place of great refuge and home to many kahuna who guarded a special heiau with reverence.

Much of Kula's natural and indigenous isndscape barely exists. The thinking then, should be to reverse the Impact on the land, such as planting shrubs untive to the area, desecrate the land as little as possible, and to stop the use of tactics such as

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those of the "paulolo era". More cautious approaches to certain areas are solutions to the vitality of our Hawaii.

From all indication, this project will not affect the fauna, flora or endangered species, because it was aiready impacted by prior agricultural disturbances which occurred on this project area.

'A'apueo I Ka La'i

'A'APUEO CHANT Hakn Mele - Composer - Charles Kauluwehi Maxwell

In January of 1996, I was invited by Mr. Everett Dowling to accompany him to Kula Malu, in Pukalani, to look at a 5 acre parcel of and that could be used for a Hula Halau. Mr. Dowling, my wife Nina, and I drove onto the site, and us soon as we stopped, a Hawaiian Owl (Puco) flew from the trees and circled overhead. I said to my wife, "ah Ka Hoaliona (the sign)", which meant it was a good omen to have a Puco flying overhead, leading the way. Our Hawaiian Mo'olelo (Storics) tells us about such events that have occurred in the past. After doing some research, it was found that this area was called "A'spuco, and it was an Ili (land diriston) within the Ahupua'a (district) of Kula. This chant came to me, and in 1998 the Pukalani Hula Hale performed the chant at the Merry Monarch Festival.

V.APUEO

Where the light of the moon is bright and full Mal luns mai, kilo akula kona maka From high above, she searches I ka waiwal on už iä'ae ola in For the riches of days gone by A me ka pā 'u o Ha'inakolo And the skirt of Ha'inakolo Kähe'a 'la e ka wena 'ula o ke kalao la Which is treaded by the red hews of dawn 'A'apuco be nani Maoli nō'i Peace and tranquility
In the well-tended gardens of 'ai Pohaku
In the well-tended gardens of 'ai Pohaku
Hö'sla hou (f) ka leo o 'A'apuco Eis ke hale o'A'apueo Here is the home of 'Aapueo Ke akua wahine o ka uka ia The female goddess of the uplands I ka wao kanaka o Haleakali On the slopes of Haleakali Kahi e 'ike I ke konane of Hina La 'A'opueo, so beautiful!
H!!po! 'ia I ka poll mehana la
Cradles us in the warm bosom
La'i kü mäile iho nö

The voice of 'A' apueo has reawakened
(I ka) 'sinn kappa 'ta I kona inoa la
On the land that bears her name
He Kählko lua' ole
A beauty unparalleled
I kea lo kilakila o Haleakala
On the slopes of majestic Haleakalā

Cornell to build the building of the following for the following the fol

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Francis K. Lamadora Interview Form

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Earl N. Lamadora Interview Form

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INTERVIEWER: Chilis A. Money S.

INTERVIEWERS SIGNITURE: L DATE & TIME: 2/6/03 -

l understand that my statement will be used in a public document and it is my understanding that before it is published, I will bay a chance to see it and make corrections if needed.

Hökülani Holt-Padilla Interview Form

'A'apueo I Ka La'i A apueo In Tranquillty

<u>INFORMANTS INTERVIEWS</u>

IME & PLACE OF INTERVIEW • 2003 at 9:00am, interdewed at 157 Alea Place, Pukalani, Maul, HJ.

Housewife 3550 Haleakaiā Hwy., Pukalani, Maui, HJ. 96768 Mrs. Frances Lani Kalani Lamadora Born 1927 Hali'imaile, Maui

Interviewed at my home. She stated that she was born in Hall'timalic, and when she was a teenager, ber family moved to Pukalani. Her home is across the guich (Makawao area) of the project site. She related that when she was growing up in the area, they used to walk through the gulches, and through the project area. They used to see all kinds of "Hawalian things" in the guich, but always remembered what her parents taught them. They were not to touch things, or to be "micie" (curious) when they saw anything that belonged to the ancient culture of Hawali.

She recalls that her "Tutu" (grandparent) used to tell her that the real name for the area that they lived in was Maka'eha. Her grandmother used to scold her because they tried to shoot the owle that flew in the area with a slingshot. Her grandmother told her the owl was their Alimakua (family god), so she should not harm the owl.

embers that there was a Heiau (Hawaiian temple) above her home, but she ays told by her parents to stay away from the "stone pile". She does not er anything about the area being studied, except for the high grass that was in the area of the project.

March 5th 2003 at 9:15 am, interviewed at 157 Alea Place, Pokalani, Maul, HI,

3550 Halcakala Hwy., Pukalani, Maui, HI. 96768 Earl N. Lamadora, 30 years old.

his bome, and he was always told by his mother not to disturb anything that ed to the Hawaiian people. He was born in the house that they are living in ite had nothing further to add. At no time did he see or hear of any cultural Interviewed at my home. He stated that he did not know much about the area around his home, and he was always told by his mother not to disturb anything that belonged to the Hawaiian people. He was born in the house that they are living in now. He had nothing further to add. At no time did he see or hear of any cultural gathering in the project site.

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March 10th, 2003 at 11:00am, interviewed at the Maui Arts and Cultural Center

Cultural Specialist- Maui Arts & Cultural Center 659 Pahala St., Walluku, Maui 96793 Hökülani Holt-Padilla

Interviewed at her office. Related that she is aware of the project area, and is familiar with the past cultural history of the area. She did not know of any archaeological sites within the study area. However, she is aware of the guithes and anchaent Helau in other areas surrounding the project site.

Note: "Mr. Tadaki of Munckiyo & Hiraga, Inc. initially interviewed me for this report, then the cultural assessment was turned over to CKM Cultural Resources, with Kabu Charles K. Maxwell Sr., writing this report. Because this interview is important for this report, it is submitted with Mr. Tadaki as the interviewer." Certain corrections were made using the Hawaiian Font to the original draft

Kabu Charles Kauluwehi Maxwell Sr. Interview with:

Munekiyo & Hiraga, Inc. Glenn Tadaki, Planner Interviewed by:

Date: January 29, 2003 at 11:00am, interviewed at office of Munckiyo & Hiraga, Inc., 305 High St. Suite 104, Walluku, HI, 96793

own local radio and television shows, as well as the manager of the Phitalani Hula Hale and the executive director of Hul 'Ai Pōhaku Inc., a non-profit organization for the preservation of Hawalian Culture and Spirituality. In addition, Charles presently servers as the Chair of the Maudinanal Island Burial Comodit, and the Maui member/past chair of the Hawali' Advisory Committee to the U.S. Civil Rights Commission, and a Hawalian member of the State Shark Task Force. He is also the Hawalian Cultural Advisory to the Maui Ocean Center. Kabu (Reverend) Charles Kauluwehi Maxwell Sr. is an ordained Hawaiian priest and a spiritual bealer, as well as a well-known cultural practitioner, teacher, lecturer, and resource consultant. He is also an author, songwriter, and host of his

Charles was born in Lahains, Maui, in 1937. Three years later, Charles and his family moved to Kula, where he grew up and was raised. From birth until kindergarten, Charles spoke only Hawaiian, because that was the only language his parents spoke at home. Through public schooling, Charles learned the English As the youngest family member, Charles' parents taught him much about Hawaiian cultural practices, including religious ceremonies for reinterring ancient Hawaiian

remains. From the age of 19, Charles handled the reinterment of inadvertently discovered ancient remains.

As a teen, Charles would go into Haleakalä Crater to hunt and camp. During one of his trips, he discovered a cave containing an akua ka'al (sacred image). The information he gained broadened his understanding of the Hawalian Culture. This experience, and many others after that, have led to his becoming a member of the State Cave Task Force, which advances the knowledge of burial caves and profects their sacredness for the Hawalian people.

For 15 years, Charles served as an officer with the Maui Police Department, with 5 of those years being on the Island of Moloka'l. In 1974, Charles retired due to Injuries sustained in the line of duty.

After being injured, Charles did a lot of research on all phases of the Hawaiian culture, including oral history interviews with Küpuna (elders). He also became very active in community affairs associated with native Hawaiian rights and entiture. For example, Charles served as the first president of the A.L.O.H.A. (Abortginal Lands of Hawaiian Ancestry) Association and journeyed to Washington D.C. to seek reparations from the federal government for the overthrow of the Hawaiian Monarchy. In 1976, Charles organized and led the first native Hawaiian occupation of Kabo'olawe, to protest the use of the Island as a bombing range by the U.S. Navy. Charles was also instrumental in establishing guidelines for subsistence practices for the Island, based on ancient Hawaiian methods of Rabing. In 1991, when a tiger shark fatally attacked a woman swimming at Olowalu, Charles spearheaded efforts to snecessfully halt a shark cradication program, on the basis that the shark was the "Atimakua" (personal god) to some of the Hawaiian families. Charles currently serves as the Hawaiian advisor to the State Shark Task Force. In 1997, Charles spearheaded a drive to stop the selling of t-shirts and other trinkets in Isao Valley, Later, he lobbled the legislator to create laws to put a halt on all sales in State Parks. This law is now he existence.

In regards to the project area, Charles believed that 'A'pueo Parkway was named after the female owl-goddess who lived in the area. Charles wrote a chant about 'A'apueo, which was performed during the annual Merrie Monarch Festivals in Hilo.

In pre-contact times, Charles mentioned that lands in the project area served as the site for the observance of the Makahik, an annual event held during the months of January and February. During this time, taxes were collected and festivities held. Charles also mentioned that gulches in the area once contained adze factories, and evidence suggests that streams flowed within these guithes at one time.

During post-contact times, Charles indicated that the land, Mauka of the project site (across Kula Highway), was known for having the best sweet potato patches on the island. The sweet potatoes were planted to supply prospectors with food during the

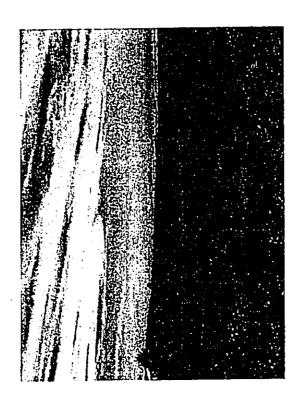
California gold rush. Later, with the advent of cattle ranching, Charles mentioned that the indigenous plants and trees in the area were whed out, and the forest line was moved further up the slopes of Haleakalā. Without the forests to capture rain clouds and facilitate precipitation, the flowing streams in the gulches ceased to be.

In terms of cultural resources, Charles indicated that he was not aware of, nor had observed, any cultural practices, gathering, or subsistence practices occurring on the land within the project area. In light of the foregoing, the proposed project is not expected to have any adverse impact on native Hawalian cultural resources, practices and beliefs.



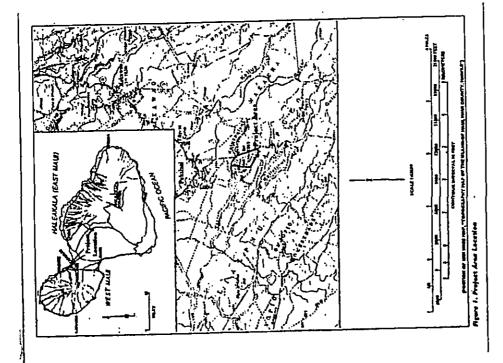
View Looking Towards Pā'ia Direction From Site

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Mauka View of Site

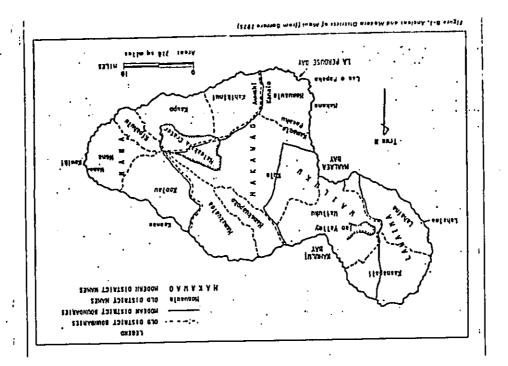
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Project Location on Maui Island Map



View Toward Haleakalā



Ancient and Modern Districts of Maui

Project Site in Kulamalu Subdivision

'A'apueo I Ka La'i

CONCLUSION - EIA KA LÁKAU

The University of Hawai'i Institute For Advanced Technology Astronomy Kulamalu Town Center, 'A'apuco', Maut, Hawai'i Tax Key #2-3-008:38, 3.425 acre site

Because of the prior disturbance, no cultural or archeological properties were found for preservation. In the 3.425 acre project area, no evidence of past or present use for Hawalian cultural practices, resources, or beliefs were found in the study area.

That does not mean that this area is free of Hawaiian cultural association. The property is surrounded by guiches (Kalialinui and Kaluapulani) on both sides, which happen to contain the best petroglyphs in the State Of Hawaii. Members of the Polynesian Voyaging Society took rubbings from a petroglyph of a canoe, and used it to fashion the sail for the Hökule'a (a Hawaiian double-builed salling canoe).

An archeological survey was completed of this area in 1996, by McPhater and Rosendahl of PHRI, and no sites were found on this property.

There are no areas of impact from the proposed construction on this site, so miligation measures are not necessary. This study area does not pose an impact on access rights by Native Hawaiians that would require the use of this area for cultural and spiritual purposes.

¹A space is a femile goddess of all the owl 'sumakua (personal god), W.H. Usua, The Legend of the Bank of the Owit, *Redu Oboc*, June 29 1871, 2. MS SC. Sterling 3.12.3.

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Kula District

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'A'apueo I Ka La'i

BIBLIOGRAPHY

Bibliography:
Piku'i, Mary Kawena, et al. Place Names of Haval'I, Honolulu, HI: University of Hawal'i Press, 1976.

United States, United States Map of Census 2000. U.S. Census 2000. Washington: GPO, 2000.

United States Geological Survey GNIS Database (November 20).

Buck, Peter H., Arts and Crafts of Hawal'I, Honolulu: Bishop Museum Special Publication No. 45, 1957.

Emerson, Nathaniel B., Pete and Hl'iaka, A myth from Hawal'I, Rutland, VT and Japan: C.E. Tuttle, 1978.

Handy, E.S. Cralghill, et al. Native Planis in Old Hawal'I, Honolulu, HI: 1991.

Kamakau, Samuel Mānalakalani, Kā Po'e Kāhiko; The people of old. Bishop Museum Special Publication No. 2, 1976.

Malo, David, Ch. 35-37 in Hawalian Antiquities, 1898. Honolulu: Bishop Museum Special Publication No. 2, 1976.

Mitchell Ph.D., D. Kilolani, Resource Units in Hawalian Culture: Revised Edition, Honolulu, HI: Kamehameha Schools Press, 2001.

Paul H. Rosendahl, Ph.D., Archaeological Reconnaissance Survey 44 Acre Pukalani Terrace Subdivison 111.

Elspeth P. Stertling, Sites of Maui, Bishop Museum Press, 1998.

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